AVIATION

The Oldest American Aeronautical Magazine

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MARCH 30, 1929 Issued Weekly PRICE 20 CENTS

Flight picture of the Berliner-Joyce, three passenger, parasol type monoplane.

VOLUME XXVI NUMBER 13

Special Features

Blind Flying Instruction in France

Detroit's All-American Aircraft Show

The New Zeppelin Plant at Akron Airport

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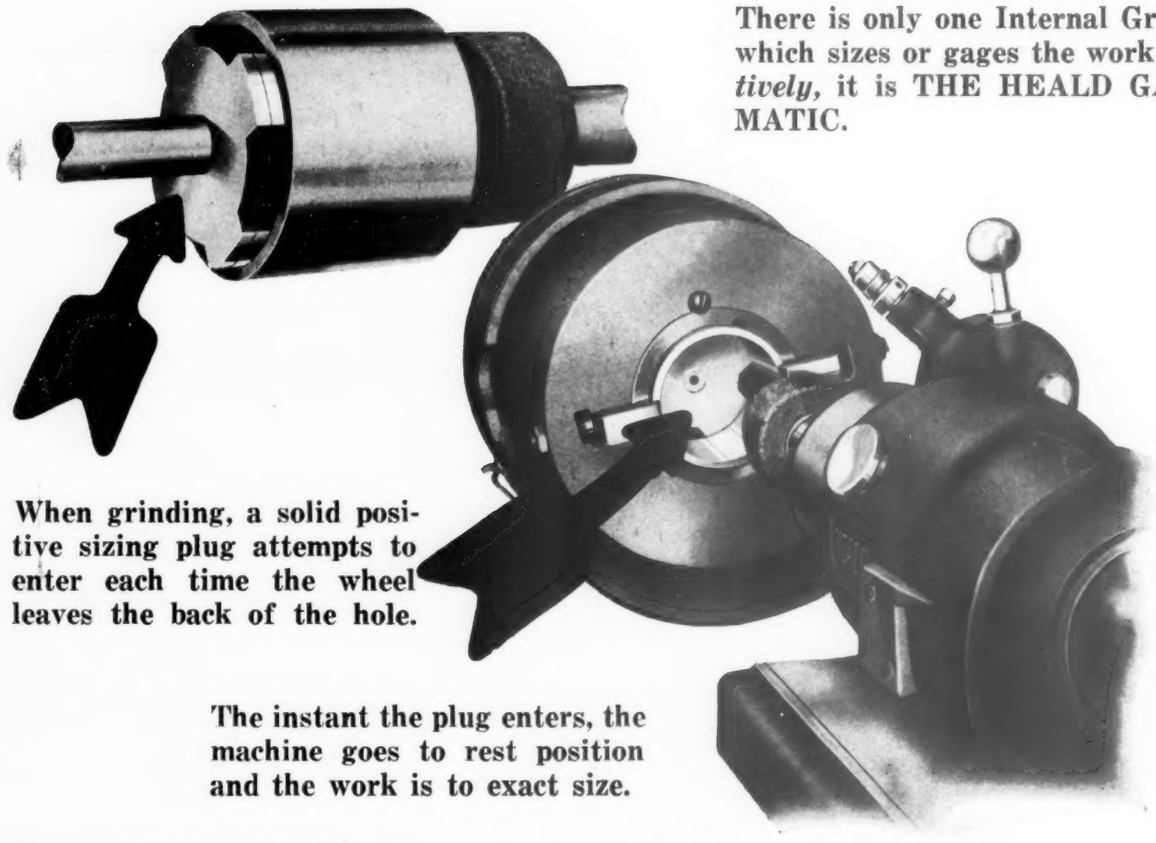

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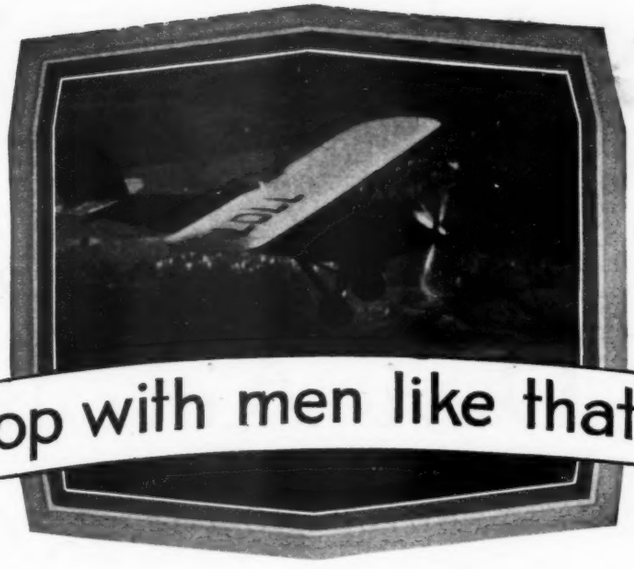

"You can hit the top with men like that!"

The Berliner-Joyce ships, and the entire engineering staff are seasoned by years of outstanding accomplishment.

FIRST, look at the engineering staff:

As Chief Engineer, Frank S. Hubbard (*Mass. Inst. Tech.*) brings a wealth of experience, coming directly from the responsibility of executive head of the Technical Department of Curtiss.

And standing beside him as Chief of Research is William H. Miller (*Univ. Missouri and M.I.T.*) an outstanding aerodynamic expert, designer of the wind tunnels at Massachusetts Institute, lately in charge of Research Laboratory at Curtiss.

Design and Construction

William Wait, Jr. is best known as the design engineer on the most successful Curtiss models, including the Schneider Cup and Pulitzer Trophy racers. Then he went to Chance-Vought and now is Berliner-Joyce Chief of Design.

Earl P. Osborn (*Rensselaer Polytechnic*) is in charge of Structures. He was in charge of the propeller department at Curtiss, later made head of Curtiss Structural section.

As factory superintendent, Thos E. Pell (*Lehigh Univ.*) brings a wealth of experience, from the same responsibility with the Naval Aircraft Factory at Philadelphia.

Back of It—

Henry Berliner (*Mass. Inst. Tech.*) was the designer and builder of the Berliner helicopter and monoplane, and president of the absorbed Berliner Aircraft Company. He becomes *Vice-President* of Berliner-Joyce in charge of Production.

Temple N. Joyce (*Balto. Poly. and Lehigh Univ.*) is internationally known as test pilot for the Army during the war, testing practically every type of plane constructed by the Allied and Central Powers. Later Washington representative of the Curtiss Company, and then sales manager for Chance-Vought. He is *Vice-President* in charge of Sales.

Gathering this truly unusual technical and manufacturing staff together, stands W.W. Moss, formerly Vice-President and Controller of Curtiss, who is *President* of the new Corporation.

The Future

What do you expect of such an experienced and balanced staff as this? The B-J ships now in design promise to set new standards in aviation.

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THANK YOU *for mentioning* AVIATION

CAPTAIN WALTER C. DAVIS AND ASSOCIATES ANNOUNCE THE ORGANIZATION OF THE—

Davis Aircraft Corporation

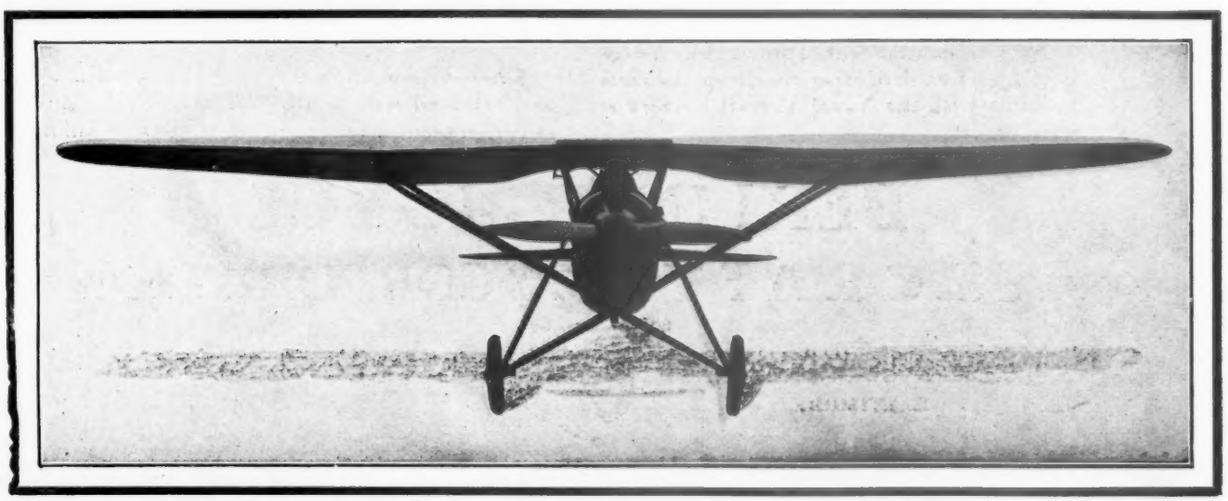
BUILDING THE DAVIS

A 2-PLACE HIGH WING

THE Davis Aircraft Corporation has purchased the Vulcan Aircraft Company, and its product "The American Moth." This plane, with certain improvements, is now in production as the *Davis Monoplane*, in the modern factory of the Davis Aircraft Corporation, at Richmond, Indiana.

The Davis Monoplane—then known as The American Moth—took first place among Class A planes in the Los Angeles-Cincinnati Air Derby, and second place in the New York-Los Angeles Air Derby—conclusively demonstrating its air-worthiness and exceptional performance. The only changes which have been made in the Davis Monoplane since that time are those which experience has shown to improve its already remarkable qualities.

With ample financial resources, a skilled manufacturing and technical staff, and management which has been actively interested in aviation for more than fifteen years, the Davis Aircraft Corporation is pledged to the constant improvement and development of a plane which is particularly adapted in flying characteristics, low operating costs, and moderate price, for school purposes and the private owner.



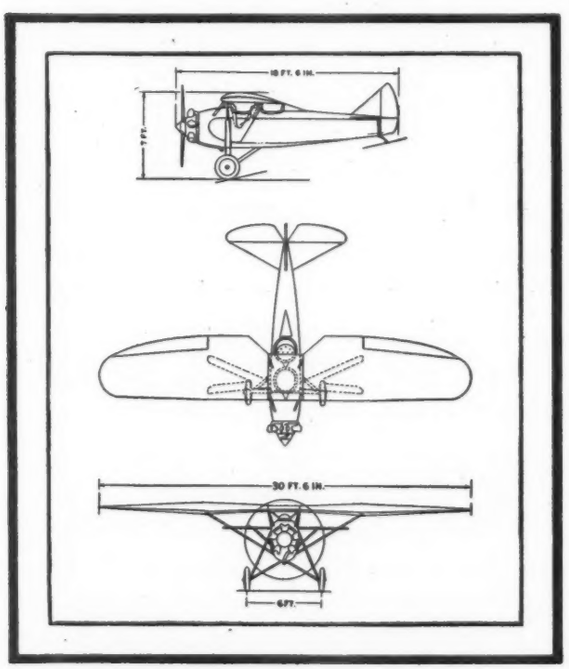
THE DAVIS is a light monoplane, built particularly for school instruction and the private owner of moderate income, who wants to fly his own plane—and take a companion with him.

Embodying aero-dynamic principles hitherto undeveloped in a plane of its type and class, the Davis Monoplane possesses performance characteristics, maneuverability and *stability in rough weather*, far beyond previous experience. Structurally, the Davis Monoplane meets all Department of Commerce requirements, with large safety factors. With the exception of wing spars and fabric covering, it is of all-metal construction throughout.

Clear vision, quick takeoff, unusual stability, and conservative landing speed contribute to safety in the hands of the student pilot. Low maintenance and operating costs appeal alike to the private owner and the flying school.

MONOPLANE

MONOPLANE—"THE AMERICAN MOTH"



$2965, F. a. f., Complete
Flyaway at Field

PERFORMANCE (Actual)

Service Ceiling	10,000 feet
High Speed	95 M. P. H.
Landing Speed	40 M. P. H.
Cruising Speed	80 M. P. H.
Cruising Range	350-400 Miles
Fuel Consumption (at cruising speed)	4½ gallons per hour
Climb	700 ft. per minute

SPECIFICATIONS

TYPE—2-Place, Tandem, Dual Control, Open Cockpit, High Wing Monoplane.

POWER PLANT—LeBlond Radial, 60 H. P. at 1950 R. P. M.; Hartzell wood propeller.

WING—30 ft. 6 in. span; 145 sq. ft. area; airfoil, Gottingen 387 at lift struts, modified to Clark Y at center section and at wing tips; tapered. Laminated spruce box spars; Dural ribs.

FUEL CAPACITY—25 gallons.

TAIL SURFACES—Elevators, 12 sq. ft. Rudder, 6 sq. ft. Adjustable Stabilizer, 9½ sq. ft. Vertical Fin, 3½ sq. ft.

LENGTH OVERALL—18 ft. 6 in.

HEIGHT—7 feet.

WEIGHT, EMPTY—770 pounds.

PAYLOAD—350 pounds.

DISPOSABLE LOAD—540 pounds.

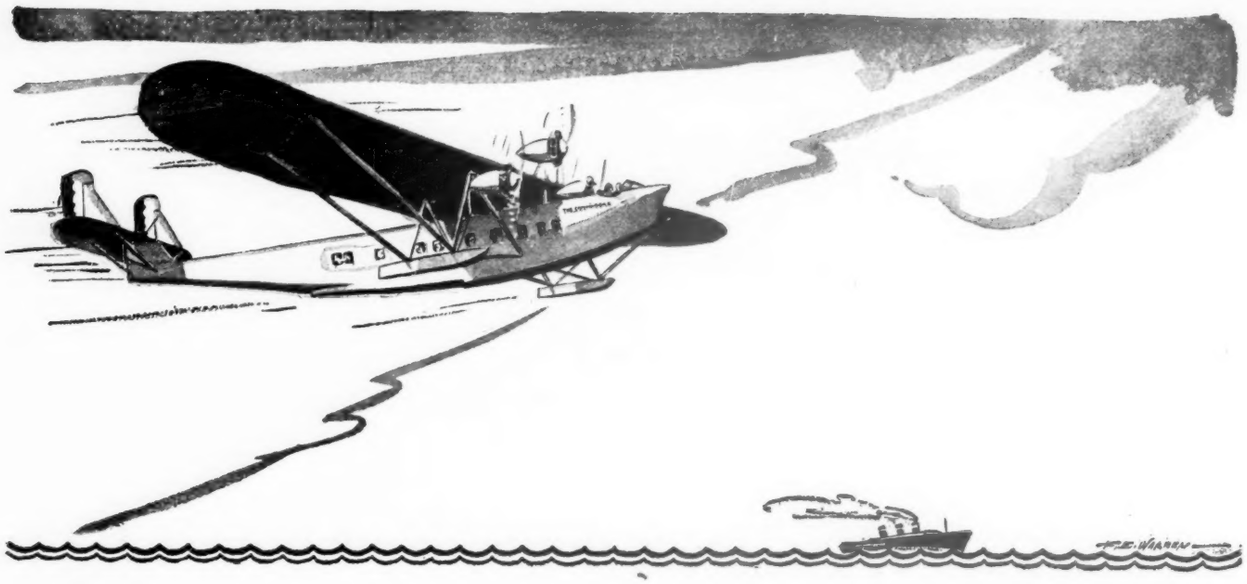
NORMAL WEIGHT, LOADED—1300 pounds.

CONTROLS—Dual, stick and rudder bar. Equipment: Consolidated Instrument Panel Including tachometer, altimeter, oil pressure and temperature gauges; tools, emergency kit and fire extinguisher.

DAVIS AIRCRAFT CORPORATION

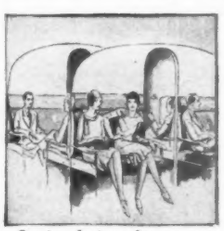
Richmond
Indiana

DAVIS
AIRCRAFT



ON *the* HIGH-WAYS *of the* SKY...

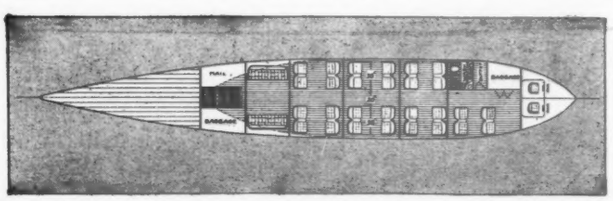
. . . up and down the coast . . . over harbor, lake and river . . . above mountain, plain and valley . . . throughout the Western Hemisphere, the aerial carrier plies its course—winging its way night and day in the service of mankind. Cities and towns with the better terminal facilities—both land and water—are bound to receive the balance of trade, just as the transport operator who is better equipped to serve these communities will enjoy the maximum revenue. Competition in the air, even today, demands superior equipment—planes that carry increased pay loads, cover greater distances and comply with the imperative needs of safety and speed. The Commodore, the sister-ship of the Consolidated patrol plane XPY-1 which won the Navy's contest of 1928 for the most efficient general-purpose, heavy-duty flying boat, has been designed to cope commercially with aviation's advanced and advancing needs. The Commodore is a modern Leviathan of the air, with comfortable and commodious accommodations for thirty-two passengers, in addition to baggage, mail and express compartments. To co-operate with established air transport operators, individuals or organizations contemplating a commercial service, we will gladly furnish facts and figures—a complete survey showing how The Commodore fulfils in every way the growing needs of commerce on the high-ways of the sky.



Sectional view of passenger compartments

CONSOLIDATED · AIRCRAFT · CORPORATION · BUFFALO · NEW YORK

The Commodore is an all-metal constructed, internally braced, monoplane with a wing span of 100 feet and an overall length of 60 feet. It can land and take-off in a heavy sea, if necessary. Three "Wasp" engines furnish the power—high speed 130 m. p. h.—cruising speed well over 100 m. p. h. The control cockpit is in the nose of the hull, connected to the main cabin by a door. The main cabin consists of five separate compartments, as illustrated. Each compartment has its own ventilators. The seating arrangement is such as to permit one double berth on each side of three compartments, thus affording sleeping accommodations for twelve persons. Space is available under the



seats for life preservers, and two hatches are provided in the deck for emergency. The interior decorative scheme of the passenger compartments is optional. Seats are upholstered in mohair or velour to match the interior trim, and the metal flooring in the cabin is carpeted. Complete accommodations are provided for a steward.

The COMMODORE

A.V. Roe AVIAN — In England

WHITTELSEY AVIAN — In America

ENGLAND'S

FAMOUS SPORT AND TRAINING PLANE

makes her American debut *with a new name*

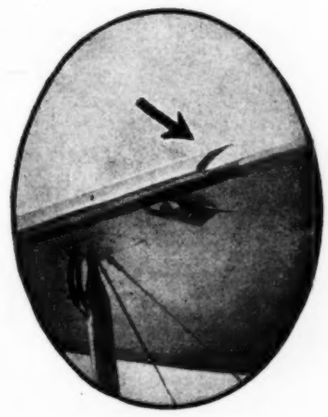
WHITTELSEY AVIAN

No other light training or sport plane has contributed more than the Avian to the conquest of the air and to public acceptance of the aeroplane as a safe, efficient mode of travel for business and sport.

The famous Avian stands on its record-making performances which immediately set it apart as the safest, most dependable and easiest to handle training and sport plane in the world. Its claim to fame is found in the records it holds:

First solo flight, England to Australia . . . ***Fastest time,*** England to Australia . . . ***Longest flight*** ever made in a light aeroplane . . . ***Longest solo flight*** ever made . . . ***Fastest time,*** England to India . . . ***First non-stop flight,*** London to Rome.

This plane is now under production in this country under sole royalty rights with the trademark, Whittelsey Avian.



Slotted Wings: Handley-Page standard equipment. Permits stalled turns without falling into a spin. Enables decreased landing speed. Improves lateral control. Practically eliminates possibility of ship going into spin in clouds or fog.

WHEN you sell and fly the Whittelsey Avian you have something to talk about. No other light plane has such a background of achievement. No other light plane offers more attractive features.

Economy of Operation: 20 miles to gal. of gas; 500 miles to gal. of oil. *Speed:* Maximum, 102 m. p. h ; cruising, 85 m. p. h.; landing, 35 m. p. h. Ceiling: 17,000 feet. *Cruising Range:* 5 hours or 430 miles. *Weights:* Light, 875 lbs.; aerobatics, 1475 lbs.; top, 1600 lbs. *Dimensions:* Wing span, 28 ft.; width folded, 9½ ft.; height overall 8½ ft.; length overall 24 ft.

Power Plant: Cirrus Mark 111, 95 h. p. air-cooled, four-cylinder in-line aircraft engine. Famous for economy of operation and maintenance. Top over haul at 200 flying hours.

Price: Only $4995, Fly-away, or F.O.B., Bridgeport, Conn.

We are completing national distribution of this light plane that has already gained national acceptance.

If you believe that you are equipped to handle the Avian as an exclusive distributor or dealer for your airport we will gladly supply you with further information concerning our sales plan. Write the Whittelsey Mfg. Co., Dept. A-5, Main Office and Plant, Bridgeport, Conn. (formerly Whittelsey Body Co.)

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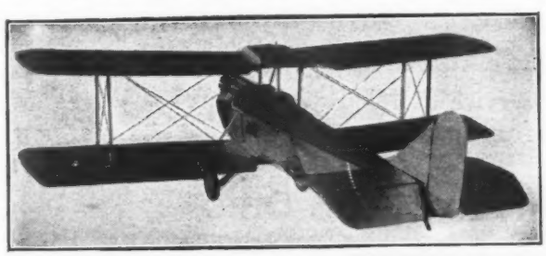

Safety: Wide tracked, sturdy undercarriage permits slower landing speed and lowers point of danger when landing on rough ground.

Being displayed at the All-American Aircraft Show, Detroit, April 6 to 15

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD

See the new WACOs at the Detroit Show

The Measure of Value

The makers of WACO, from the beginning, have had as their prime objective, to build and market aircraft of unequalled value. The phenomenal success of WACO attests the degree to which that objective has been attained.

And with the steady increase in WACO sales, has come expansion of production facilities and resultant economies which have been reflected in continually greater value to WACO owners.

The latest WACO models, to be displayed next week at the Detroit show reflect this cumulative value in an impressive fashion. Even the lowest-priced WACO, besides possessing the performance characteristics and staunch construction for which WACO is famous, offers now choice of fuselage colors, cockpits upholstered to match. ample luggage compartment, navigation lights and *complete* equipment.

See the new WACOs at the Detroit show . . . or send for descriptive literature. Check the specifications. Compare the performance. Evaluate the "invisibles" which are the proof of merit.

You will find airplanes cheaper than WACO. But you will find none less costly.

For value is measured not by first cost but by service . . . dependable, satisfying performance.

THE ADVANCE AIRCRAFT COMPANY, TROY, OHIO

WACO AIRPLANES

"Ask any pilot"

One of a series of advertisements featuring the 22 manufacturers who have standardized on Aerol Landing Struts.

THE KEYSTONE-LOENING AMPHIBIAN LANDS ON AEROL STRUTS

It has been the privilege of our engineers to co-ordinate their skill with that of Grover Loening, one of the foremost aeronautical engineers of today. The Keystone-Loening Amphibian, designed with courage and vision, presented a unique problem in adapting Aerol Struts to the folding undercarriage.

The accompanying close-up view shows how this was accomplished without compromising the remarkable landing performance for which Aerol Struts are famed. It is the oleo-pneumatic principle of these struts that enables them to perform so effectively in reducing and smoothing out landing shock and shortening both the landing and take-off rolls.

That Aerol Struts are an accepted performance factor in the industry is amply proven by the fact that 22 manufacturers have already standardized on them and practically all others are recommending them as optional equipment.

Aerol Struts are manufactured by The Cleveland Pneumatic Tool Co., Cleveland, Ohio. Any requests for information will be gladly received and promptly answered.

Ask the Pilots Who Land on Them

AEROL *shock absorbing* **STRUT**

See the

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and other well known aeronautical engine builders

at the

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The majority of modern American Aeronautical Engines are equipped with Scintilla Magnetos.

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Vol. XXVI **March 30, 1929** **No. 13**

Index to Contents

EDITORIALS 949
DETROIT'S ALL-AMERICAN AIRCRAFT SHOW 950
BLIND FLYING INSTRUCTION IN FRANCE 954
THE NEW ZEPPELIN PLANT AT AKRON AIRPORT 956
AERONAUTICAL TRAINING AT DETROIT UNIVERSITY 958
INSTALLATION AND CARE OF AIRCRAFT ENGINES 960
AIRPLANE DESCRIPTIONS 963
NEWS SECTIONS .....965 TO 975
BUYER'S LOG BOOK..... 976
SIDE SLIPS 976
INDEX TO ADVERTISERS..... 995

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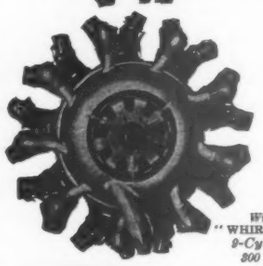

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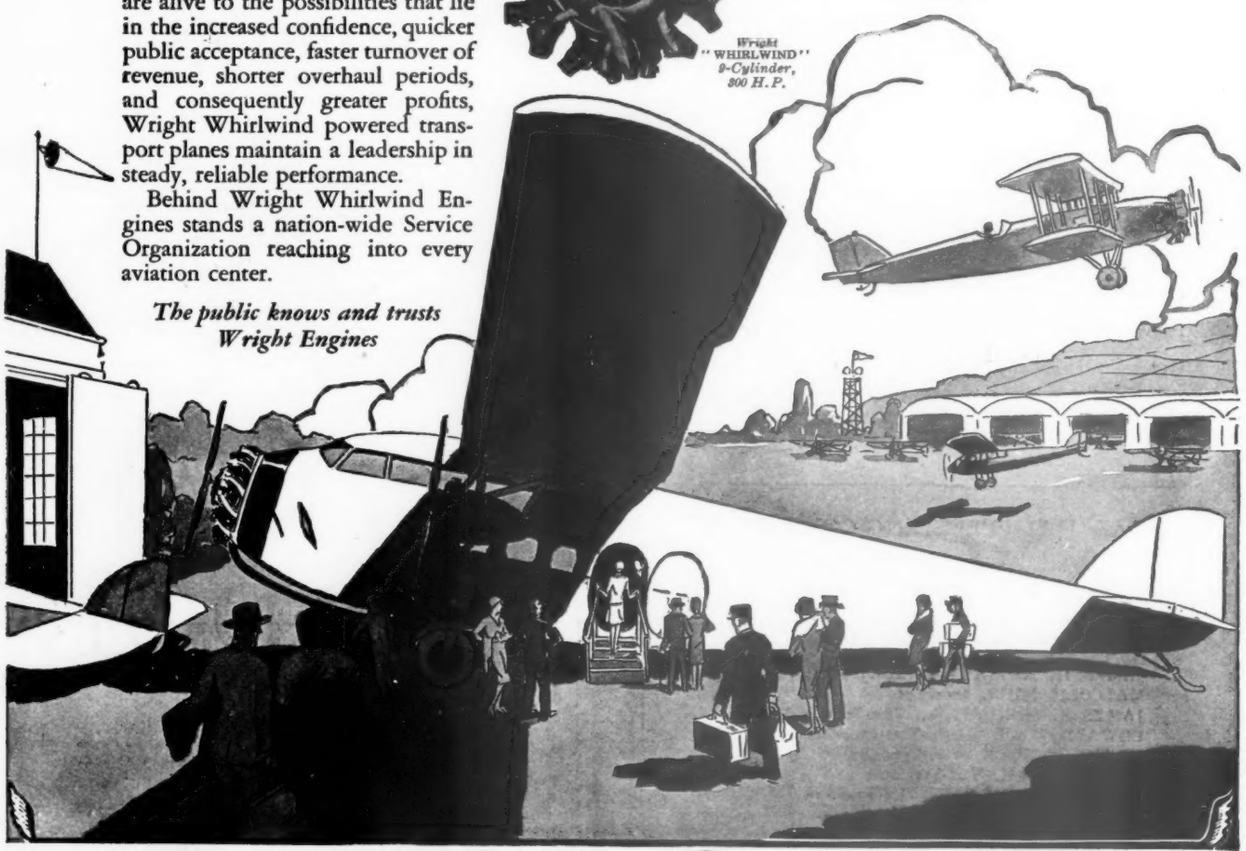
In offering the famous Wright Whirlwind Engine in three power sizes, 150 H.P., 225 H.P. and 300 H.P., with 94% component part interchangeability, the advantages secured to plane builders are obvious. Smaller inventory and shorter repair and overhaul periods in servicing become the "edge" upon which sales are consummated.

To those air-line operators who are alive to the possibilities that lie in the increased confidence, quicker public acceptance, faster turnover of revenue, shorter overhaul periods, and consequently greater profits, Wright Whirlwind powered transport planes maintain a leadership in steady, reliable performance.

Behind Wright Whirlwind Engines stands a nation-wide Service Organization reaching into every aviation center.

The public knows and trusts Wright Engines

Daily—Hourly the World Increasingly Responds to the Call of the Swift Avenues of the Air—with Confidence in Safety!



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AVIATION

The Oldest American Aeronautical Magazine

Vol. XXVI MARCH 30, 1929 No. 13

War Pilots

DURING the late war there were between ten and fifteen thousand men who either had actual flight training, or a certain amount of experience in the air. However, the majority of those men gave up their aeronautical activities as soon as they got out of service, and their reasons for such action were varied. When speculating as to those reasons one must consider the very unfavorable conditions under which the war pilots were forced to fly.

To begin with, the training planes were a bit difficult and perhaps a bit dangerous to fly, and as a rule had little performance. Therefore, the average war flying student did not possess an over amount of confidence in the plane, and went about his task with the feeling that his existence on this planet depended upon how quickly he mastered the art of flying. And that feeling was continually increased by the sight of his bunk-mates spinning into the ground all about him. In addition to all that, the demand for pilots at the Front was so great that students were virtually rushed through their training, and either shipped overseas or held on these shores to act as instructors and endeavor to pass on their meagre knowledge to other beginners. In short, in those hectic days of conflict the pilot had to virtually teach himself to fly, grab what air experience he could, and bank on the chance that he would get by when he reached the Front.

However, there were thousands of crack pilots developed during the war, and it is quite possible that from the standpoint of actual flight aloft the war pilots were superior to the present day pilots. The point, though, is that in the time of war the thrill and excitement of flying far outweighed all thoughts as to personal danger. But, when the war was over and the flare of battle had died down the majority of war pilots gave up their flying because their experiences had impressed them with the fact that flying in war had its points, but flying in peace was another story altogether.

As a result, the war pilots have been so engaged in other pursuits in life that they have not realized the tremendous strides that have been made in the design, safety, and ease of maneuverability of the present day airplane. Of course the great flights of the last two years have brought many of the war pilots back into the game, and have stirred up the old longing to get back in the air in many others. However, the latter have not returned because of the feeling they had toward flying at the end of the war, and because they do not realize the simplicity of present day flying. In fact, many a war pilot has been astonished beyond measure upon taking his first hop after an absence of years from the game. When once he had to "fight" the controls he now sits back and "lets her ride." And where once he had to pile down and then "wind brake" it onto the ground, he can now let the plane almost land herself.

Indeed, flying has changed since the war, and the danger has been minimized to a marked degree. There is no need to feel as one felt in 1918, and in view of the fact that there still exists the old lure of the air in the heart of every non-post war flying war pilot it would be to their benefit and the benefit of the industry for them to give the game another try. The aeronautic industry has need for that type of man, and all who succeed in getting them into the air again, so that they can see for themselves what flying is today, will have contributed more than a little toward the future development of aeronautics.

Safety Belts

WE often get so accustomed to a word that we forget its origin and real meaning. Safety belts were first used when the pilots of the old pusher planes sat way out in front and in the open, and the safety belt felt very comfortable. Whoever coined the word knew what he said and said what he meant. Planes, however, have changed since those early days and it is hard to fall out of the seats of the present day planes, but the original meaning still holds. A safety belt does add very materially to the safety of flying. One may not need it in ten thousand miles of flying but when the time comes it serves its purpose, and the humble safety belt has probably saved more lives than the spectacular parachute.

Every so often a downward gust of wind strikes a plane with such force that the plane will drop out from under the pilot. Every so often the pilot will make a maneuver which tends to raise him from the seat or he will try flying up-side down (as happened to us last week). Especially in cabin planes, where a violent gust or a bad maneuver may throw the passengers to one end of the cabin, the safety belt is of value. In our opinion, the primary value of the safety belt is, however, in the case of bad landings. If a plane noses over or runs into something, the pilots and passengers are much more apt to get hurt if their safety belts are not well fastened. In the case of a severe crash, the safety belt helps materially in breaking the force of the impact.

It is sometimes argued that in case of a crash it is safer to be thrown clear of the plane. This would probably be true if one were always sure of being thrown clear and of landing on nice soft turf. Except in the low wing open cockpit monoplane, however, there are few planes in which the front seat passengers can be thrown clear. In most cases the structure of the plane will absorb a good deal of the force of the crash, especially if the plane has a chance to skid along the ground.

Safety belts should be comfortable and easy to put on and take off. They should be strongly fastened to a substantial member of the fuselage and not to the seat, as otherwise the seat and belt may put out together.

TACOMA PUBLIC LIBRARY

Detroit's All-American Aircraft Show

By JOHN T. NEVILL

SETTING a new and highly pleasing precedent in the staging of American aircraft expositions, the second annual All-American Aircraft Show, held under the joint auspices of the Detroit Board of Commerce and the Aeronautical Chamber of Commerce of America, Inc., will open in Convention Hall, Detroit, Mich., one week from this date.

Despite a regrettable lack of floor space, due to no fault of the Show Committee, which resulted in the necessary rejection of applications from nearly a dozen additional manufacturers, the Detroit show, exhibiting a total of 107 airplanes, entered by 66 different manufacturers, and a total of 134 accessory booths, will be the most representative picture yet presented of America's aircraft industry.

The second All-American Aircraft Show, a fitting exposition of a $100,000,000 industry, will be more than a revelation of the giant strides taken during the past few years in aeronautical and mechanical engineering. With all Who's Who in aviation attending, and all of What's What in aviation to be seen, the Committee in charge has converted the Show into what might well be termed an educational institution. So varied is the program, and so many the activities scheduled to be carried out in conjunction with the Show that one finds it difficult to know how to describe it.

Ray Cooper, who is the manager of the Detroit All-American Aircraft Show

Mayor John C. Lodge, of Detroit, has issued a proclamation designating the show week, April 6-14, as Aviation Week. All of America has been invited by the mayor to participate in observing this tribute to the most romantic of industries. In response to letters of invitation broadcast by the Detroit Board of Commerce approximately 24 delegations from Chambers of Commerce from many parts of the United States will attend the Show.

Following similar invitations to 5,200 airplane owners in the United States, at least 500 planes are expected to descend upon 11 airports and landing fields within the Detroit area prior to or during the Show. The St. Joe Aviation Club, of South Bend, Ind., alone, has notified the Committee it will sponsor the flight to Detroit of nearly 50 planes.

National meetings of at least half a dozen nation-wide aeronautical organizations are a certainty during the Show, and similar meetings of an equal number are in prospect. These will include important meetings by the Aeronautic Section of the Society of Automotive Engineers, and the Aeronautical Chamber of Commerce of America, individually and jointly; meetings of the flying school committee of the Aeronautical Chamber of Commerce, the Commercial Airplane Manufacturers' Association, the Inter-Collegiate Aviation Society, the National Glider Association, and a number of additional organizations affiliated with the aeronautic industry.

More than 50 civic and industrial clubs within the Detroit area are holding special aviation meetings during the show week, these meetings to be addressed by men and women whose names are household words to those in the industry. Barring last-minute changes, the program will include addresses on varied subjects by William P. MacCracken, Jr., F. Trubee Davison, W. Irving Glover, Edgar Gott, Charles L. Lawrence, Paul Henderson, Lester Seymour, Reed Landis, Alexander Klemin, Glenn Curtiss, General W. E. Gillmore, Lady Mary Heath, Miss Amelia Earhart, P. W. Litchfield, J. Don Alexander, Porter Adams, C. S. Jones, Col. H. H. Blee, Ivan Driggs, Gen. Frank P. Lahm, Governor Fred W. Green, of Michigan, Thomas Halpin, Clyde Cessna, Major Ralph Royce, B. Russell Shaw, Herbert Sadler, Ralph Irwin, Frank Tichenor, D. H. Hollowell, Lawrence Le Page, Dr. George W. Lewis, Capt. Walter Davis, A. J. Edwards, and others.

On the theory that the future of aviation depends largely upon the air-mindedness of the children of today, the Committee has sought and secured the cooperation of the Detroit Board of Education, which organization will do much to center the attention of the city's 300,000 school children on the aircraft show. Approximately 250,000 exchange tickets will be distributed among the schools, admitting each child to the show at a reduced price of 25 cents. All children under 16 yr. of age will be admitted for 25 cents every day between the hours of 10 A. M. and 5 P. M. The exposition's daily hours will be from 10 A. M. until 10.30 P. M., except on Saturday (opening day), when the doors will be formally opened at 7 P. M.

The second annual All-American Aircraft Show has been and is being well advertised. Besides a liberal use of the trade magazines as well as the daily press, the Committee has posted 110 24-in. sheets on billboards in and

about the City of Detroit. Through cooperation of the railroads 17 great railway systems, extending from the Atlantic to the Pacific, will placard their stations with posters prepared by the Committee. In addition, 24 of Detroit's largest hotels will have displays advertising the Show prominently located in their lobbies.

The services of nine bands have been secured through courtesy of six Detroit organizations, and there will be a musical program broadcast every night. This has been arranged with the cooperation of three Detroit radio stations.

Several hours prior to the show opening aerial parades will be staged over the city by the famous First Pursuit Group, United States Army Air Corps of Selfridge Field, the 107th Observation Squadron, Michigan National Guard, and Detroit's naval reserve squadron.

Aside from its remarkable number of exhibits, one of the most impressive things about the Detroit Show, and a feature that accentuates the rapidity with which the industry is moving along, will be the number of entirely new planes placed on the market within the past year. Although all of the manufacturers are, of course, displaying their very latest products, many of which have never been publicly shown, Ray Cooper, manager of the Show, reports there are in the Show approximately 20 craft absolutely new in the field. Among the new products exhibited in the airplane division are the Acme monoplane, the Eaglerock "Bullet," the Arrow biplane, the Berliner "Dragon" monoplane, the Cadillac amphibian, the Century "Centurian," the Curtiss "Thrush," the Doyle "Oriole," the Eastman "Sea Rover," the "Invincible" monoplane, the Knoll biplane, the Rearwin biplane, the St. Louis "Cardinal," the Trella biplane, and the Verville "Air Coach." A number of others, such as the Davis "Red Head," and the Kreutzer "Air Coach," have been shown but once before.

Striking also is the great number of new names in the accessory section, this field growing so rapidly the show management could have filled the 166,000 sq. ft. of floor space with accessory exhibits alone. Engines entered include the American Cirrus, Axelson, Brownback, Continental, Curtiss, Dayton, Jupiter, Le Blond, Lycoming, Rover, Pratt & Whitney, Warner and Wright.

Manager Cooper and the Show Committee originally planned on staging the show in a huge one million dollar hangar and exposition building that was to have been constructed in time for the Show on the city's municipal airport. Because of political bungling, however, both the airport and the large hangar still are in a more or less theoretical state, causing the management to be seriously handicapped for space. This, despite the fact Convention Hall boasts of the largest ground floor exposition hall in America. Because of this handicap Manager Cooper, at this writing, has been compelled to reject applications from a total of 15 airplane manufacturers and a total of 45 accessory companies.

Included in the Board's Show Committee are Edward S. Evans, William B. Mayo, William E. Metzger, Capt. L. M. Woolson, Eugene W. Lewis, Harry R. Graham, and W. Magruder Jones. The work of bringing the show about has been actively in charge of Mr. Cooper, Karl S. Betts, Director of Publicity, Foye Shumaker, Harry Richert, and Henry O. Weitschat, of the Aircraft Bureau of the Detroit Board of Commerce.

Edwara S. Evans, a member of the Show Committee of the Detroit Board of Commerce.

Barring last-minute changes, aircraft manufacturers exhibiting in the Show are as follows:

As this is written the aircraft exhibitors, with their exhibit and the man designated to be in charge of the booth are as follows:

Acme Aircraft Corporation, Rockford, Ill. One plane. One Acme "21" two-place open monoplane. Span, 36 ft. Length, 23 ft. Chord, 6 ft. Height, 6 ft. A. J. Zimmermann.

Advance Aircraft Company, Troy, O. By Knapp Flying Service, Ypsilanti, Mich. Four Waco biplanes (specifications not listed). M. E. Olliphant.

Aeromarine Klemm Corp., New York, N. Y. One plane. One Aeromarine Klemm, two place, open monoplane. Span, 40 ft. Length, 22 ft. 6 in. Chord, 6 ft. 7 in. Height, 6 ft. H. Allan Sullivan.

Alexander Aircraft Company, Denver. By Kysor Eaglerock Company, Niles, Mich. Two planes. One three place. Eaglerock open biplane. Span, 36 ft. 8 in. Length, 25 ft. Chord, 5 ft. 2 in. Height, 9 ft. 11 in. One Eaglerock Bullet, four place, cabin monoplane. Span, 38 ft. 7 in. Length, 21 ft. 1 in. Chord, 6 ft. 3 in. Height, 7 ft. 4 in. Willis E. Kysor.

Alliance Aircraft Corp., Alliance, O. One plane. One "Argo" two place, open biplane. Span, 28 ft. 8 in. Length, 20 ft. 4 in. Chord, 4 ft. Height, 8 ft. 4 in. Aubrey W. Hess. The Alliance Corporation will also have on exhibition the Hess "Warrior" 7 cylinder engine and parts.

American Aeronautical Corp., New York City. One plane. One American Marchetti, three place, open amphibian. J. Lansing Callan.

American Eagle Aircraft Corp., Kansas City. Two planes.

Arrow Aircraft and Motors Corp., Havelock, Neb. By Flo Flying Service, Ann Arbor, Mich. One plane. One Arrow Sport, two place, open biplane. Span, 26 ft. Length, 19 ft. 2 in. Height, 6 ft. 11 in. Leonard Flo.

Bellanca Aircraft Corp., New Castle, Del. One plane. One Bellanca CH, six place, cabin monoplane. Span, 46 ft. 4 in. Length, 27 ft. 9 in. Chord, 6 ft. 7 in. Height, 8 ft. 6 in. Alfred D. Chandler.

Berliner-Joyce Aircraft Corp., Inc., Baltimore, Md. One plane. One "Dragon," three place, open monoplane. Span, 36 ft. Length, 26 ft. Chord, 6 ft. 3 in. Height, 8 ft. 4 in. Henry A. Berliner.

Boeing Airplane Co., Seattle, Wash. One plane. One Boeing Mail Plane. Open biplane for pilot only. Span, 44 ft. 3 in. Length, 31 ft. 11 in. Chord, 86 in. Height, 12 ft. 1 in. Lieut. Erik H. Nelson.

Buhl Aircraft Co., Marysville, Mich. Three planes. One Senior "Airsedan," eight place, closed sesquiplane. Span, 48 ft. Length, 36 ft. Chord, 8 ft. Height, 10 ft. One Buhl Sport, three-passenger closed sesquiplane. Span, 36 ft. Length, 28 ft. Chord, 6 ft. Height, 8 ft. One Buhl Standard, six passenger, closed sesquiplane. Span, 40 ft. Length, 29 ft. Chord, 6 ft. 9 in. Height, 8 ft. 6 in. Herbert Hughes.

Butler Aircraft Corp., Kansas City. One plane. No specifications.

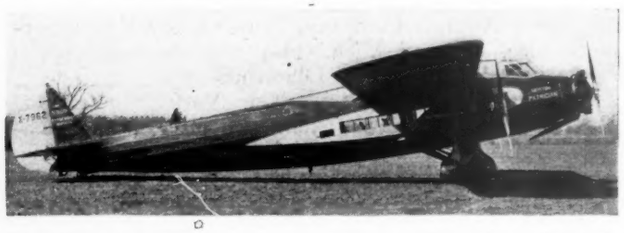
Cadillac Aircraft Corp., Detroit. One plane. One four passenger closed monoplane flying boat, known as the "Voyageur Macair Duoplane." Span, 46 ft. Length,

32 ft. Chord, 105 in. Height, 11 ft. H. G. McCarroll.

Century Aircraft Corp., Kansas City. One plane. One Centurian, three passenger closed monoplane. Span, 32 ft. 3 in. Length, 5 ft. 10 in. Height, 7 ft. 4 in. Archie Siegling.

Cessna Aircraft Co., Wichita. Two planes. No specifications.

Chance Vought Corp., Long Island City, N. Y. One plane. One Vought Corsair (02U) two passenger open



The Keystone 20 passenger transport monoplane "Patrician," now on a tour of the United States.

biplane. Span, 36 ft. Length, 30 ft. Chord, 5 ft. 4 in. Height, 10 ft. Paul Becker.

Command-Aire, Inc., Little Rock, Ark. Two planes. One Command-Aire 5C-3, three passenger open biplane. Span, 32 ft. 6 in. Length, 24 ft. 6 in. Chord, 5 ft. Height, 8 ft. 4 in. One Command-Aire, 3-C, 3-T two passenger open biplane. Same dimensions. Maj. J. Carroll Cone.

Cunningham-Hall Aircraft Corp., Rochester, N. Y. One Cunningham-Hall six passenger, cabin biplane. Span, 42 ft. Length, 29 ft. 6 in. Chord, 6 ft. 6 in. Height, 11 in. W. R. Winans.

Curtis-Reid Aircraft Co., Ltd., Montreal, Que. One plane. One Curtiss-Reid Rambler, two passenger open biplane. Span, 33 ft. Length, 22 ft. 6 in. Chord, 5 ft. 6 in. Height, 8 ft. James Town.

Curtiss-Robertson Airplane Co., St. Louis. By Curtiss Flying Service of Michigan. Three planes. One twelve passenger Sikorsky amphibian closed sesquiplane. Span, 71 ft. 8 in. Length, 40 ft. 3 in. Height, 13 ft. 10 in. One Curtiss Robin, three passenger closed cabin monoplane. Span, 41 ft. Length, 25 ft. 9 in. Height, 7 ft. 10 in. One Curtiss "Thrush," four place cabin monoplane. (No specifications available.) C. V. Burnett.

Davis Aircraft Corp., Richmond, Ind. One plane. One Davis "Red Head," two place open monoplane. Span, 30 ft. Length, 18 ft. Chord, 5 ft. Height, 6 ft. Capt. Walter C. Davis.

Doyle Aero Corp., Baltimore, Md. One plane. One "Oriole," two place open monoplane. Span, 30 ft. Length, 19 ft. Chord, 5 ft. 2 in. Height, 7 ft. 11 in. Harvey Doyle.

Driggs Aircraft Corp., Lansing, Mich. Two planes. One "Skylark," two place open biplane. Span, 32 ft. Length, 22 ft. Chord, 44 in. Height, 7 ft. One "Coupe," two place cabin biplane. Span, 28 ft. Length, 23 ft. Chord, 3 ft. 8 in. Height, 8 ft.

Eastman Aircraft Corp., Detroit. One plane. One "Sea Rover," three place open flying boat. Span, 36 ft. Length, 26 ft. Chord, 5 ft. 8 in. Height, 7 ft. 8 in. James H. Eastman.

Fairchild Airplane Mfg. Co., New York City. Three planes. One Fairchild "71," seven place cabin monoplane. Span, 50 ft. Length, 33 ft. Chord, 7 ft. Height, 9 ft. 6 in. One Fairchild "21," two place open monoplane. Span, 28 ft. 3 in. Length, 21 ft. 6 in. Chord, 6 ft. Height, 5 ft. 8 in. One Fairchild "41," four place cabin monoplane. Span, 36 ft. Length, 25 ft. Height, 8 ft. A. A. Woodruff.

Fokker Aircraft Corp., New York City. Three planes. One "Super-Universal," seven place cabin monoplane. Span, 50 ft. 7 in. Length, 36 ft. 7 in. Height, 8 ft. 11 in. One F-10 tri-motored, fourteen place cabin monoplane. Span, 79 ft. 3 in. Length, 50 ft. Height, 12 ft. 8 in. One F-11 amphibian "flying yacht." Eight passenger cabin monoplane. Span, 51 ft. Length, 45 ft. Height, 13 ft. Representative not designated.

General Airplanes Corp., Buffalo. One plane. One "Aristocrat," three place cabin monoplane. Span, 36 ft. 2 in. Length, 25 ft. Height, 7 ft. 7 in. Representative not designated.

Gliders, Inc., Orion, Mich. One glider. One place monoplane. Span, 34 ft. Length, 15 ft. Chord, 5 ft. Height, 8 ft.

Great Lakes Aircraft Corp., Cleveland. Two planes. One Martin "74," six place cabin biplane. Span, 53 ft. Length, 34 ft. 8 in. Chord, 6 ft. 7 in. Height, 14 ft. 7½ in. One new training biplane.

Hamilton Metal Plane Co., Milwaukee. Two planes. One eight place closed monoplane. Span, 54 ft. 5 in. Length, 34 ft. 8 in. Chord, 10 ft. Height, 9 ft. 6 in. One closed monoplane. Span, 60 ft. Length, 36 ft. Chord, 10 ft. Height, 10 ft. 6 in. C. B. Knudsen.

Heath Airplane Company, Chicago, Ill. Two planes. One Heath "Super-parasol," one place open monoplane. Span, 25 ft. Length, 16 ft. 9 in. Height, 5 ft. 10 in. One "Baby Bullet," racing plane.

Invincible Metal Furniture Co., Manitowac, Wis. One plane. One four place closed "Invincible" monoplane. Span, 38 ft. Length, 24 ft. 4 in. Chord, 6 ft. 8 in. Height, 6 ft. 8 in. George H. Alter, John A. Schuetle and Irl Beach.

Ireland Aircraft, Inc., Garden City, N. Y. One plane. One Ireland closed monoplane amphibian. C. V. Burnett, Curtiss Flying Service of Michigan.

Keystone Aircraft Corp. (Loening Division), New York City. Entry not designated. Stanley N. Jacques.

Knoll Aircraft Corp., Wichita. One plane. One Knoll KN-1, four place closed biplane. Span, 33 ft. 6 in. Length, 23 ft. 10 in. Chord, 65 in. Height, 9 ft. 4 in. H. P. Warner.

Kreider-Reisner Aircraft Co., Hagerstown, Md. Two planes. One Challenger, three place open biplane. Span, 30 ft. 1 in. Length, 23 ft. 9 in. Height, 9 ft. 4 in. One three place Challenger open biplane. Span, 30 ft. Length, 23 ft. 2 in. Height, 9 ft. 8 in. By Skyways, Inc., Flint, Mich.

Kreutzer Aircraft Corp., Los Angeles. One plane. One Kreutzer "Air Coach," six place, tri-engined, closed

The American Marchetti S-56, a three passenger amphibian flying boat powered with a 110 hp. engine.

monoplane. Span, 48 ft. 10 in. Length, 33 ft. Chord, 7 ft. Height, 9 ft. 6 in. Lieut. Henry H. Ogden.

E. M. Laird Airplane Co., Chicago. Two planes. One with span 34 ft. Length, 25 ft. Second with span, 28 ft. Length, 23 ft.

Lincoln Aircraft Corp., Lincoln, Neb. One plane. One open biplane, three place "Lincoln Page." Span, 32 ft.

Length, 26 ft. Chord, 5 ft. 6 in. Height, 7 ft. 10 in. Victor H. Roos.

Mahoney-Ryan Aircraft Corp., St. Louis. One plane. One Ryan brougham.

Metal Aircraft Corp., Cincinnati. Two planes. One Flamingo, six place cabin monoplane. Span, 50 ft. Length, 35 ft. Chord, 8 ft. Height, 8 ft. One tri-engined plane, specifications not listed. Thomas Halpin.

Mohawk Aircraft Corp., Minneapolis. Two planes. One Pinto, low wing open monoplane. Span, 31 ft. Length, 24 ft. One Pinto, same dimensions. H. A. Sheridan.

Mono-Aircraft, Inc., Moline, Ill. Three planes. One Monocoupe, two place cabin monoplane. Span, 32 ft. Length, 20 ft. Chord, 5 ft. Height, 7 ft. One Monoprep, two place open monoplane. Span, 30 ft. Length, 20 ft. Chord, 5 ft. Height, 7 ft. One Monocoach, four place cabin monoplane. Span, 40 ft. Length, 26 ft. Chord, 6 ft. Height, 8½ ft. D. Luscomb.

Moth Aircraft Corp., New York City. One plane. One "Gipsy Moth," two place open biplane. Span, 30 ft. Length, 23 ft. 11 in. Height, 8 ft. 9½ in. Earl L. House.

Nicholas-Beazley Aircraft Co., Marshall, Mo. One plane. One Barling, NB-3, three place open monoplane. Span, 32 ft. 6 in. Length, 21 ft. 6 in. Chord, 5 ft. 2 in. Height, 6 ft. 10 in. Russell Nicholas.

Overcashier Aircraft Mfg. Co., Detroit. Two planes. One Overcashier, three place cabin monoplane. Span, 35 ft. Length, 25 ft. Chord, 6 ft. Height, 8 ft. One three place cabin monoplane. Span, 40 ft. Length, 25 ft. Chord, 6 ft. Height, 8 ft. Frank Overcashier.

Paramount Aircraft Corp., Saginaw, Mich. Two planes. One "Cabinaire," four place cabin biplane. Span, 34 ft. 8 in. Length, 23 ft. Chord, 6½ ft. Height, 9 ft. (Land plane with Warner engine.) One Cabinaire, same dimensions, with 150 hp. 5 cylinder Wright, equipped with Edo pontoons.

A side view of a Pratt & Whitney "Wasp" powered, Sikorsky "Amphibion" of the S-38 type.

Parks Aircraft, Inc., St. Louis. One plane. One Parks, four passenger, closed monoplane. Span, 45 ft. Length, 34 ft. 6 in. Chord, 8 ft. 4 in. Height, 9 ft. H. P. Mammem.

Pitcairn Aviation, Inc., Philadelphia. Two planes. One "Super Mailwing," open biplane, for pilot only. Span, 33 ft. Length, 22 ft. 10 in. Chord, 54 in. Height, 9 ft. 3 in. One plane in skeleton form.

Rearwin Airplane Co., Saline, Kan. One plane. One Rearwin, three place open biplane. Span, 35 ft. Length, 25 ft. Chord, 5½ in. Height, 10 ft. R. R. Rearwin.

Lockheed Aircraft Co., Los Angeles. By Schlee-Brock Aircraft Corp., Detroit. Two planes. One Lockheed Vega, five place cabin monoplane. Span, 41 ft. Length, 27 ft. 6 in. Chord, 7 ft. 6 in. Height, 8 ft. 6 in. One Lockheed Vega, seven place cabin monoplane. Span, 42 ft. 6 in. Length, 27 ft. 6 in. Chord, 7 ft. 6 in. Height, 8 ft. 6 in. Dwight Davis.

Simplex Aircraft Corp., Defiance, O. Three planes. One Simplex Red Arrow, two place open monoplane. Span, 34 ft. 2 in. Length, 20 ft. Chord, 5 ft. Height, 7 ft. One Simplex Red Arrow, 2 place, open monoplane. Span, 34 ft. Length, 20 ft. Chord, 5 ft. Height, 7 ft. One Simplex Red Arrow, 5 place cabin monoplane. Span, 43 ft. Length, 30 ft. Chord, 8 ft.

Spartan Aircraft Co., Tulsa, Okla. Two planes. One Spartan, 3 place open biplane. Span, 32 ft. Length, 22 ft. Chord, 5 ft. Height, 9 ft. 10. One Spartan 4 place, open monoplane. Span, 44 ft. Length 30 ft. Chord, 6 ft. 8 in. Height, 13 ft. 4 in. J. F. Nagle.

New Standard Aircraft Corp., Paterson, N. J. One plane. One New Standard, open sesquiplane. Span, 45 ft. Length, 26 ft. Chord, 70 in. Height, 10 ft. 2 in. George Daws.

Stearman Aircraft Co., Wichita. Five planes. One Stearman Challenger, 3 place open biplane. Span, 40 ft. 1 in. Length, 23 ft. 9 in. Height, 9 ft. 4 in. One Stearman Challenger, 3 place open biplane. Span, 30 ft. Length, 23 ft. 2 in. Height, 9 ft. 8 in. One Stearman, 3 place open biplane. Span, 35 ft. Length, 24 ft. One Stearman, 4 place cabin biplane. (Specifications not available.) One Stearman, 5 place cabin biplane. (No specifications.) By Skyways, Inc., of Flint, Mich.

The new Stearman "Speed Mail," designed for air mail work and powered with a "Cyclone" 525 hp. engine.

Stinson Aircraft Corp., Detroit. Two planes. One Stinson "Detroiter," 6 place cabin monoplane. Span, 45 ft. 10 in. Length, 32 ft. Chord, 7 ft. Height, 12½ ft. One Stinson Junior, 4 place cabin monoplane. Span, 41 ft. 10 in. Length, 26 ft. 3 in. Chord, 6 ft. 3 in. Height, 8 ft. 6 in. William A. Mara.

St. Louis Aircraft Corp., St. Louis. One plane. One Cardinal C-2, 2 place cabin monoplane. Span, 32 ft. 4 in. Length, 20 ft. 7 in. Chord, 5 ft. Height, 7 ft.

Stout Metal Airplane Co. (Division of Ford Motor Company, Detroit.) Two planes. No specifications.

Swallow Airplane Co., Wichita. Two planes. (Specifications not available.) George R. Bassett.

Swift Aircraft Co., Wichita. Two planes. One Swift Sport, 2 place open biplane. Span, 29 ft. Length, 20 ft. 5 in. Chord, 4 ft. 6 in. Height, 8 ft. 5 in. One Swift Training, 2 place open biplane. Span, 33 ft. Length, 24 ft. 5 in. Chord, 4 ft. 5 in. Height, 9 ft. A. J. Edwards.

Travel Air Manufacturing Co., Wichita. Two planes. (Specifications not available.) Walter H. Beech.

Trella Aircraft Co., Detroit. One plane. One Trella Speedster, 2 place open biplane. Span, 27 ft. 6 in. Length, 19 ft. 6 in. Chord, 4 ft. Height, 7 ft. 6 in. F. Jay Trella.

Verville Aircraft Co., Detroit. One plane. One Verville "Air Coach," 4 place cabin monoplane. Span, 41 ft. Length, 28 ft. Chord, 6½ ft. Height, 7½ ft. Alfred V. Verville.

Whittlesey Mfg. Co., Bridgeport, Conn. Three planes. One Avro Avian, 2 place open biplane. Span, 28 ft. Length, 24 ft. Height, 8 ft. 6 in. One Whittlesey Avian, 2 place open biplane. One Avro Avian.

Consolidated Aircraft Corp., Buffalo, N. Y. Two planes. One Consolidated biplane. One Fleet biplane.

The above list is, of course, subject to last minute changes, which undoubtedly will occur.

Blind Flying Instruction *in* France

By Henry J. White
Sikorsky Aviation Corp.

OF late the question of blind flying has been a much discussed subject.

In Europe, where the payment of subsidies is frequently dependent upon maintenance of schedules, flying from point to point without the aid of intermediate points of reference has been developed to a high degree of perfection, it having reached the point where trips are commenced absolutely irrespective of weather conditions, so long as the field of destination is sufficiently clear to allow the pilot to see enough to land.

Without reference to radio compass bearings which enable the pilot to keep informed of his geographical position, it is of course necessary that he be capable of manoeuvering his plane by instruments with as much confidence as with full vision, and this training, including take-offs, is now being given at the Farman School of Blind Flying (ecole de Pilotage sans Visibilite Exterieure). The school is operated under the direction of Lucien Rougerie, and has been training military and air line pilots for a year.

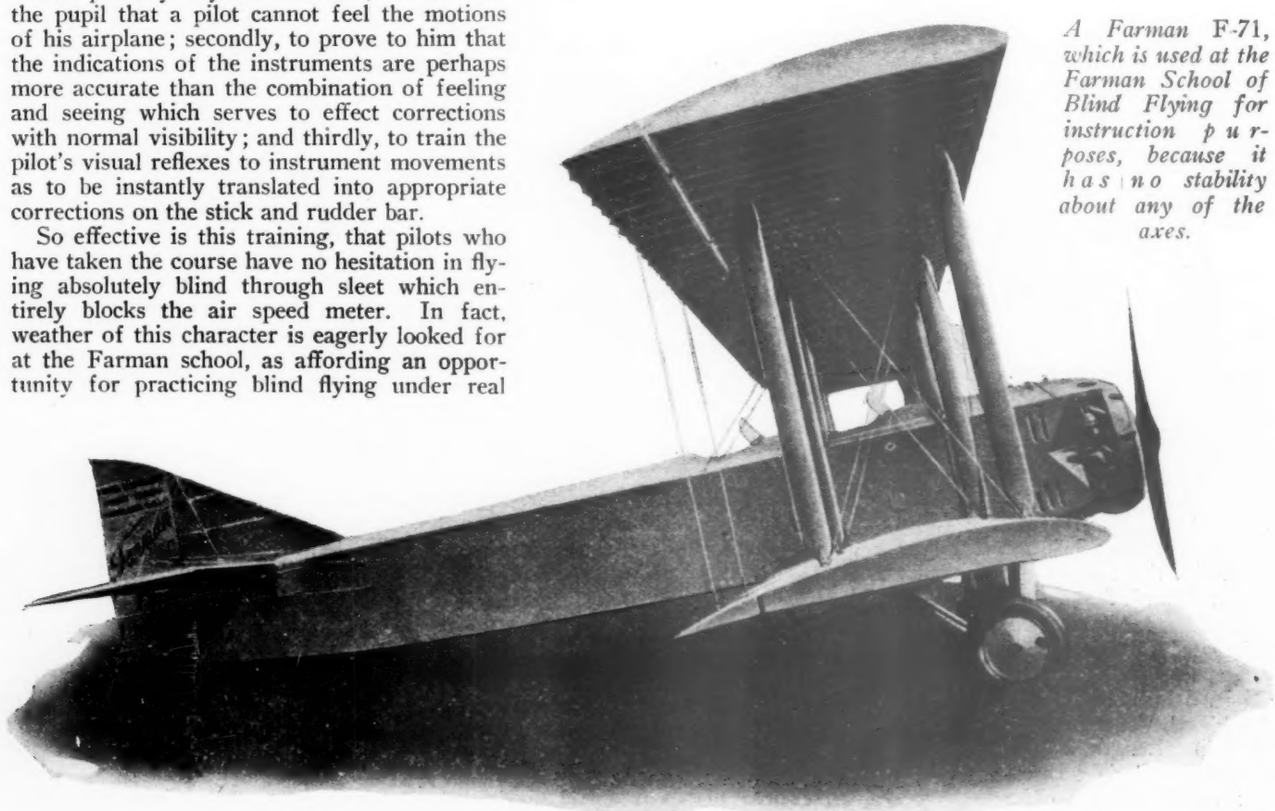
The primary objects are: first, to convince the pupil that a pilot cannot feel the motions of his airplane; secondly, to prove to him that the indications of the instruments are perhaps more accurate than the combination of feeling and seeing which serves to effect corrections with normal visibility; and thirdly, to train the pilot's visual reflexes to instrument movements as to be instantly translated into appropriate corrections on the stick and rudder bar.

So effective is this training, that pilots who have taken the course have no hesitation in flying absolutely blind through sleet which entirely blocks the air speed meter. In fact, weather of this character is eagerly looked for at the Farman school, as affording an opportunity for practicing blind flying under real conditions. It must be remembered that sufficient visibility near the ground for landing is assumed in every case.

The training begins with careful study of all flying instruments, particularly the "flight indicator" (indicateur de vol), which is a combination of the air speed meter with the turn-and-bank indicator in such a form that the turn indicator needle appears in a narrow slot directly below and adjoining the air speed meter, while the bank indicator is in a second slot just beneath. A fore-and-aft level is located right alongside this instrument.

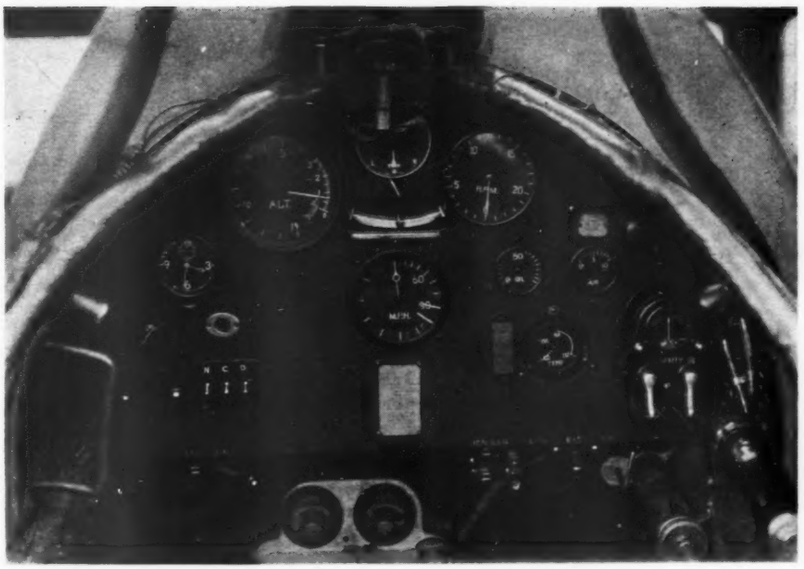
Other instruments are normally arranged, with a horizontal compass swung in gymbals as close as possible to the flight indicator. It has been found that it is necessary to swing the compass in gymbals because it is less affected by sudden short movements of the airplane in rough weather, if so suspended.

The student pilot is then introduced to an instrument of torture known as the "banc d'entrainement," or the training bench, invented and patented by M. Rougerie.



A Farman F-71, which is used at the Farman School of Blind Flying for instruction purposes, because it has no stability about any of the axes.

This affair resembles nothing so much as a half a barrel, with two seats and controls so arranged that the student pilot can see nothing except a set of imitation instruments, and a set of controls which are connected to nothing at all. The student and instructor take their seats, and the instructor begins to move the instruments, in the meanwhile observing and correcting the student's countering movements.



The instrument board of an American mail plane.

At first, the instructor moves only one instrument at a time, when it is comparatively easy for the student to follow; then, he makes multiple motions of bank and turn indicator in the same direction, which is still not too difficult; and finally, movements of the two in opposite directions, after a few moments at which the average pilot finds himself very glad to get out of the barrel and take a mental rest. After a few moments of relaxation, the training is begun again, accompanied by movements of the air speed meter and fore-and-aft level, as well as of the altimeter, tachometer and compass, and continued until the student can make the proper corrective motions with reasonable rapidity and in the correct direction.

At this point, actual flight training is begun, the plane being a Farman F-71, which has been selected for the purpose on account of having no stability around any axis.

After a short normal flight, the pupil is placed in the front cockpit and is covered over by a hood, the only light in which is a very small opaque deadlight, directly behind his head. The instructor takes the rear cockpit and taxies the plane onto the runway, relinquishes the controls, and opens the throttle, leaving the pupil to maintain a direct course by means of the turn indicator. It is necessary to watch closely the air speed meter, maintaining if possible a constant rate of increase, as leveling off blind invariably results in nosing down and striking the ground.

A course is then communicated to the student by phone, and he is given an opportunity to attempt to maintain this course at an altitude of about 1000 feet.

It is generally found after a few moments the student becomes so confused by previously acquired habits of reacting to sensations and the apparent lack of relationship between the indications of his instruments and the said sensations, that he will allow the airplane to get into what would be dangerous positions, and has to look away from his instruments and relinquish the plane to the instructor for a few moments until he can re-establish his balance.

As time goes on, the period between proper maintaining of position and the overpowering confusion of sensation and vision grows longer, until gradually, the indications of the instruments are reacted to, with the proper corrective motions without conscious effort, and the student finds himself flying with the same ease and confidence as with full vision. This moment becomes apparent to the student when he finds that other thoughts begin to enter his mind, and this takes place at the conclusion of from four to seven half-hour flights. At this time, the instructor begins to insist on absolute course keeping, and to instruct in turns, which are made quite flat, with the bank indicator slightly on the opposite side of the center from the turn indicator. Overcontrolling is generally a feature of this part of the training.

Until the pupil is able to change course without overrunning the compass point selected for the new course, and without gain or loss of air speed, this training is continued, being made more difficult by the instructor changing engine revolutions from time to time.

Next, spiral glides are made, with and without power, and spiral climbs are also effected, until finally the pupil is able to take off and fly to a given point and back without other assistance than telephone instructions from the other pilot. Upon arriving over a designated airport, the instructor takes the controls and makes the landing.

It was the writer's good fortune to get an hour and a half in a thick cloud bank, with sleet and bumps, or "blows of tobacco" (coup de tabac), as the French call them, and was astounded and pleased to find that Joanny Burtin, the instructor, considered that a heavy sheet of ice all over the plane, with great chunks of ice bouncing off the propeller, was no excuse for being two degrees off the course, and that a complete non-functioning of the air speed meter, due to ice, did not in any way affect the fore-and-aft level, which is equally serviceable in connection with the engine revolutions and the altimeter.

It is a strange fact that it is easier for the relatively green blind pilot to fly under the hood than in the open, for changes of light, the temptation to look at the wing tips, and the rattling of ice on the wings and fuselage, all tend to upset the equanimity of the beginner, and at times the impression of turning or banking is so overpowering that the pilot will find himself squeezed up into some corner of the cockpit, while at the same time his hand is busy apparently intensifying the abnormal flying position into which he feels himself slipping—while actually, if he is correcting according to the instruments, he is really bringing the plane back to normal flying position.

After some practice, and with confidence in his instructor, his instruments and his airplane, the student finds himself as much at home in clouds as in clear weather, and from that time on he has no fear of his ability to go from place to place, his only concern being enough visibility near the ground to enable him to make a normal landing.

The writer ventures to predict that flying by instruments will, when aided by radio, be more accurate and safer than flying as now practiced, and that even with large planes, there will be two pilot seats, one for take off and landing, and one for flying the route, the latter being completely inclosed, where the instrument pilot may sit in complete comfort, and devote his full attention to holding the course, while the landing and take-off pilot attends to navigation and watches out for other airplanes.

The New Zeppelin Plant at Akron Airport

By Walter E. Burton

WHEN Goodyear-Zeppelin engineers undertook the planning and erecting of the world's largest building—the giant airship factory and dock now being built at the Akron, Ohio, municipal airport—they tackled a job almost as big as actual construction of the two new 6,500,000 cu. ft. Navy Zeppelins which will be assembled inside the structure.

Erection of a building covering 8½ acres of ground and, because of its peculiar purpose, having no interior posts or pillars to hold it up, is presenting numerous and novel engineering problems. Actual work on the building was started late last year. It is to be completed early in 1930.

The new airship factory and dock was designed by Wilbur Watson & Associates, Cleveland, Ohio, working under the direction of Dr. Karl Arnstein, vice-president and chief engineer of the company. The construction of the airship factory is under W. C. State, Consulting Engineer under C. C. Slusser, Vice-President and Factory Manager of The Goodyear Tire & Rubber Company. Perhaps the greatest design problem was to determine the shape of the building so that it would offer the least practicable resistance to wind, and would cause the formation of the smallest number of disturbing air currents—for air currents are important factors in the handling of a huge airship, especially near its hangar.

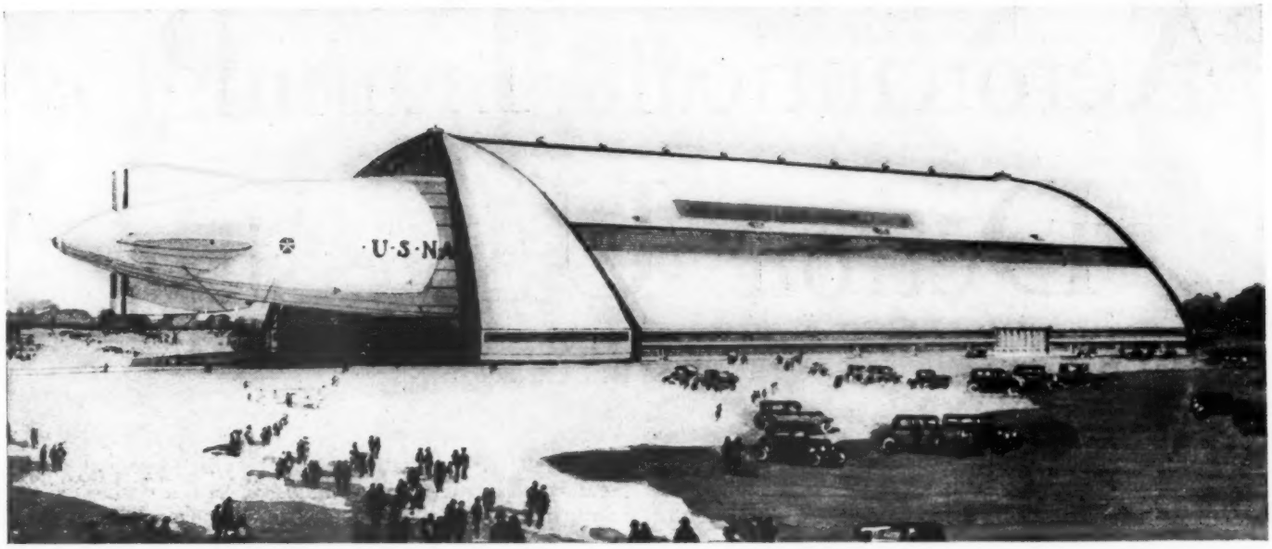
The final design was for a structure having roughly the shape of an egg split in two along its longest axis and resting with the flat surface on the ground; in other words, a semi-ellipsoid, as the drawing on the next page will show.

Then, once the shape was determined, came the problem of doors. There must be some means of opening and closing practically the whole of each end of the building in a reasonably short period of time, and again the setting up of troublesome air currents must be avoided. It was evident that the doors must be of unusual shape, differing radically from the well-known sliding kind.

To meet the requirements of the problem, the "orange-peel" door was designed. Each door segment, as the name suggests, resembles a portion of a giant orange peel—one-fourth of the peel on the sphere. The segments are referred to technically as quadrants of a sphere.

Leaving the doors for a time, the next important engineering problem involved temperature. The hangar is to be all steel, consisting of a steel framework covered with thin steel plates, riveted together. One of the physical characteristics of steel, is its change of length, area and volume in rough proportion to change in temperature. Therefore, a building approximately 1,175 ft. long, 325 ft. wide and 205 ft. high, will be constantly changing its dimensions in accordance with temperature. At freezing temperature it will be about one foot shorter than on a hot summer day. Other changes will be in proportion. As there is no known way of eliminating thermal expansion, it was decided to mount the entire huge structure on heavy rollers so that it will be free to expand and contract as changes in atmospheric conditions take place.

Above: Driving the concrete piles for the foundation of the Goodyear-Zeppelin Corp. airship factory and dock. Below: One end of the foundation.



A reproduction of an architect's drawing of the new 1,200 ft. dirigible hangar as it will appear when completed.

In appearance, the hangar will be virtually one huge roof, with relatively low side walls. The roof, being all steel, will have enormous weight, and will be supported by great arches of structural steel, each arch being a parabolic curve, with a hinge at the top and one at each of the ends or shoes. Each end will rest on a concrete footing which in turn is supported by concrete piles driven to bed rock 30 ft. below the surface. The arches will support many cat-walks for workmen, cranes for handling material, and the like. Stairs and elevators will give access to various platforms and walks.

Perhaps the most unusual problem, according to engineers who designed the building, is supporting and operating the orange-peel doors properly. The doors are to be of huge size, each segment or leaf weighing 600 tons; yet they must work with smoothness, rapidity and safety. When they are open, a clear, unobstructed opening, the outline of which is a parabolic arch, will be provided, and will be 180 ft. high and 240 ft. wide.

Each of the 600 ton segments will be mounted so that nearly all of the weight is carried on a series of four wheeled trucks running on circular tracks having a 200 ft. radius. At the top, holding the segments, will be special pivot hinges atttached to the main structure. Forgings and castings for each hinge will weigh three and one-half tons. Motive power for moving the orange-peel sections will be provided by four motors developing 125 hp. each. Gears driven by the motors will engage in racks attached to the door frame.

Along the two sides of the building will be rooms for housing shop equipment and the like. This portion will be very much like any other modern factory.

Inside the building and extending out into the field through the open doors will be, on each side, docking rails for use in handling large airships. Upon the rails will be operated small trucks used to take a ship into or out of the dock. The trucks will be pulled by cables which are moved by either mechanical or man power.

At the time of writing, all of the 1,300 concrete piles have been driven and concrete for the foundation is being poured. The next step, and the most difficult of the entire series, is to be the erection of the huge steel arches. Results and methods will be watched with interest by engineers in all parts of the world, for such a feat has never been attempted before. It is almost certain that much of value in building technique will come out of the successful accomplishment of the task. The material list calls for 7,000 tons of steel and 16,000 yd. of concrete, as well as huge quantities of other material. The surface of the structure will be painted by the spray method. The building is to be 50 per cent. completed by mid-summer, so that preliminary testing of airship parts and materials can be carried on in it.

Perhaps a better conception of the size of the building can be obtained by making a few comparisons. It could cover completely the national capitol building, with the exception of a small portion of the dome tip. The Woolworth building, Washington Monument and a few other odds and ends could be stored beneath its roof, the two objects mentioned lying down, of course. Fourteen football games could be played in it at one time. If the perfectly level wooden floor were covered with a mosaic of dollar bills laid edge to edge, the covering alone would be worth over two and a quarter million dollars.

Both of the two new Navy Zeppelins will be built and assembled at the new dock and factory. The building is situated on 60 acres of land less than a mile from the Akron plant of The Goodyear Tire & Rubber Co., of which the Goodyear-Zeppelin Corp. is a subsidiary. This proximity is of great value from the standpoint of availability of materials and trained men from the Goodyear plant. The new airship factory is on ground that is part of the new Akron Municipal Airport, and will serve to make the airport one of the few in the world having both lighter and heavier-than-air centers.

The new building, or rather the part to be used as a "roosting place" for airships, exclusive of the offices, shops, design and drafting rooms, and other production departments located along the sides of the building, could contain both the Graf Zeppelin and the Los Angeles at the same time, but it will be able to house but one of the new 6,500,000 cu. ft. ships because of its greater diameter.

A comparison of the ships themselves is interesting, and serves further to fix the size of the new dock.

Characteristics	*Los Angeles*	*Graf Zeppelin*	*ZRS-4*
Max gas vol., cu. ft.	2,470,000	3,700,000	6,500,000
Length overall, ft.	658.3	776	785
Max. diameter, ft.	90.7	100	132.9
Height, overall ft.	104.4	113	146.5
Gross lift, lb.	153,000	250,000	403,000
Useful lift, lb.	60,000		182,000
Engines	5	5	8
Total hp.	2,000	2,750	4,480
Max. speed, knots	63.5	69.4	72.8
Range at 50 knots, in knots	3,500	5,360	9,180.

Aeronautical Training at Detroit University

By JAMES R. CUSTER

WITH the industry moving forward as rapidly as it is, the aircraft manufacturers are confronted today with a shortage of technically trained men, and this is presenting a serious problem. Some are attempting to cope with the situation by opening schools of instruction at the factories, others by offering scholarships, and still others by vying for talent in aeronautical engineering upon a basis of wages.

However, there is but one remedy, and that lies in the training of more real aeronautical engineers. A system is in operation at the University of Detroit that seems to offer great possibilities in this connection. In the engineering college of the University, a co-operative plan of education has been in effect for some time. This plan makes use of one of the ideal principles of instruction, that of co-ordinating practical and theoretical training, and through the efforts of university officials and the willingness of local manufacturers it was extended to include students of aeronautical engineering when the school added this course to its curriculum.

The University of Detroit was one of the pioneers in establishing an undergraduate course in aeronautical engineering, leading to the degree of bachelor of aeronautical engineering. The course, which extends over five years on the co-operative basis, was started in 1921 with an enrollment of 20 students. At the beginning of the current term, 343 were matriculated.

Under the co-operative plan, the students are divided into two groups, each of which alternates at school and at work, the one receiving instruction at the university while the other is employed in some industry. The two sections interchange at the end of each succeeding four weeks, and in this manner the positions are constantly filled. The students receive wages on an hourly basis for the time they are employed, the rate for a particular job being the same as for any other workman. Thus they are enabled to earn a large part of their expenses and some become wholly self-supporting.

The theoretical instruction is outlined on a progressive arrangement of the fundamental sciences, general educational and professional studies, the aim being to give a thorough knowledge of aerodynamics, design of airplanes and engines, propellers, detailed aircraft structures, meteorology and aircraft radio communication. For the first two and one-half years, the course includes general engineering subjects and, likewise, the students are placed in the various industries so as to receive a general practical training. Many are employed at the Packard, Chrysler, Ford, and Cadillac automobile plants, while others are placed in other manufacturing, engineering and public service establishments.

For the second half of the five year course the aeronautical students are grounded in the branches of engineering pertaining directly to aviation and are assigned work in aircraft plants, as two years of experience in that particular industry is among the requirements for a B. of A. E. degree.

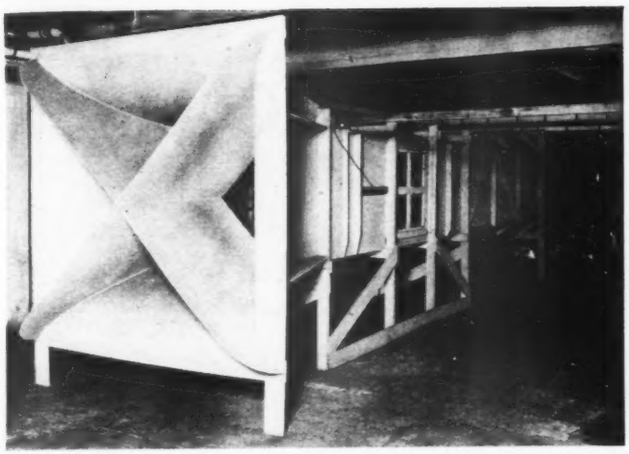
A number of students of the university are employed under the co-operative system by Stout Metal Airplane Co., Division of the Ford Motor Co., in its airplane factory at Dearborn, Mich., just outside of Detroit. These men are carefully selected on the basis of attainments and purposes, and must measure up to the standards set by the company, which does not hesitate to seek replacements of any students that fail to justify their employment.

"The co-operative student has several advantages," said a Ford official, "which tend to make him desirable from the employer's viewpoint. He is thinking past his work—it is more than merely a job to him—and so does not treat it indifferently. He studies it, comes to understand it and looks ahead to the bigger job.

"This training takes place during the formative period of the young man's life, at a time when he can be adapted more readily to the discipline and practices of the shop. This is an advantage, because he would have to become adjusted to these things sooner or later and if he waits until completing his four years of schooling, he is less adaptable. He has then learned the academic theories and perhaps may feel less willing to begin at the bottom in order to learn the practical side.

"Our foremen were at first opposed to the introduction of these co-operative students, no doubt because of their

Aero engineering school laboratory at the University of Detroit while the equipment was being installed.

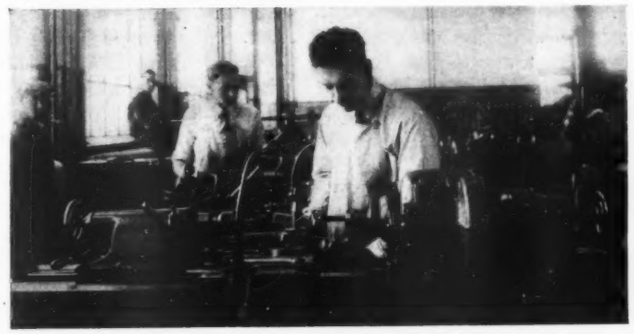


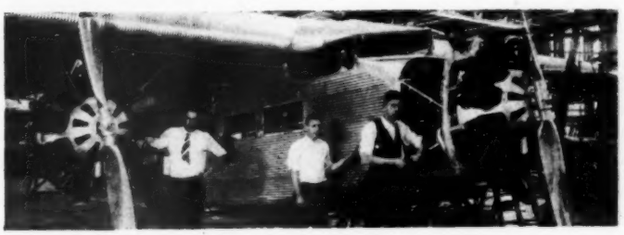
craft industry, such as general assembly, detail construction and design. The student engineers have the advantage of the most elaborate and modern equipment in the big factories, which makes it possible for them to keep in personal touch with the latest engineering developments and newest equipment."

The viewpoint of the students was expressed by Allen Dallas, a senior and president of the aeronautical society, who has found his practical experience an invaluable adjunction to his studies in the classroom. Mr. Dallas says:

"A person is at a disadvantage with only the practical training or the theoretical background, but with both one has greater confidence in himself and a better opportunity to secure a good position after he completes his course. Furthermore, I was able to earn a large part of my expenses through the co-operative employment plan."

In addition to the practical side of the training, complete laboratory courses are required in the testing of aircraft structure, aerodynamics, aircraft engines and instruments. The university, which maintains its laboratories open to firms for research work on a non-profit basis, now has under design a new aerodynamic laboratory at the engineering college building on its new 80 acre campus. A 12 ft. model of the new laboratory is at present under construction and will be used to determine the characteristics of the full-size tunnel which it will contain and which is to be 7 by 10 ft. at the working section. The model tunnel will be used for experiments in velocity, pressure and flow determination. The department also has available in the old engineering building a modified N. P. L. tunnel three and one-half feet square at the working section.





Top: The old wind tunnel at the university, which is giving way to a new and larger one. Center: Two aero engineering students learning the routine of the tool room at the Stout factory. Bottom: A group of undergraduates at work on the assembly line at the Stout factory.

During the past two years, there has been such a demand by the aviation industry for technically trained men that senior students at the University of Detroit have found ready employment on the co-operative basis in carrying out complete designs of airplanes under the supervision of consulting engineers.

Some of the other activities of the aeronautical class consist of the aeronautical society, the annual senior trip to important divisions of the industry an exhibit at the annual All-American Aircraft Show in Detroit, and in the near future it is contemplated to hold an intercollegiate glider contest. Some of the students now have a glider under construction. In April the aeronautical society will be host to the conference of Intercollegiate Aeronautical Association.

experience with graduates, or with college men who worked summers to earn money for the next year's expenses. But since the foremen have come to see the serious purposes of the co-operative students they no longer oppose their employment.

"Naturally, our idea is not entirely unselfish. It means something to us to have these earnest young men learning our policies and methods so that some of them can fit into our organization upon graduation. And there is always the possibility that among them we may find sometime a youth of more than ordinary diligence or intelligence. If that should happen, we would consider the experiment amply justified."

Among the other aircraft firms employing University of Detroit students are Capital Aircraft Co.; Eastman Aircraft Co.; Towle Marine Engineering, Warner Aircraft Co.; Stout Engineering Laboratory; Overcashier Aircraft; Gliders, Inc., aircraft division of Berry Bros.; Paramount Aircraft Co., and Detroit Air Starter.

"The co-operative student," says Prof. Peter Altman, head of the aeronautical engineering department at the University, "has a two-fold advantage over the straight academic student in that he obtains five years of practical experience in the industry, learning to judge human nature as well as the general shop methods. The former should be of great benefit in later life as an executive and the latter as a practical designer.

"Secondly, this plan enables the careful student to earn practically all of his expenses while attending school. Thus we find that the co-operative student lends a good deal of earnestness to his college work. This is principally true in the last two years of training for he is called upon to demonstrate his shop knowledge in the classes of aircraft design. It is certain that the students with a background of shop work carry out their school design more rapidly and efficiently, and on a more practical basis than those who have not had the practical shop experience.

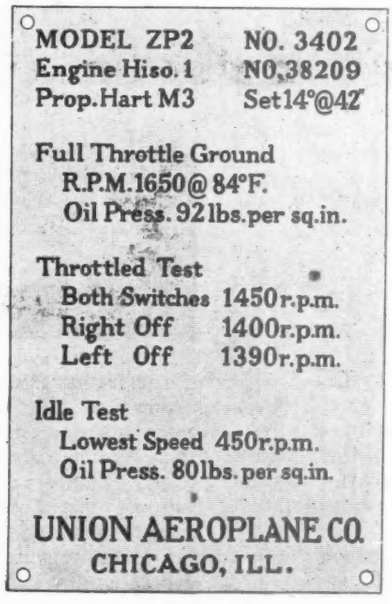
"It is the plan of the department that the student spend his first two or three years of co-operative shop work in such places as the tool rooms, machine shops, shipping rooms, etc., of the various industries allied with his course of study, thus familiarizing himself with the general shop routine and shop methods, which are invaluable in detail design.

"In the last two and one-half years of this course, he devotes his time to the more specialized work in the air-

Installation *and* Care *of* Aircraft Engines

By J. H. GEISSE
Naval Aircraft Factory

FROM 50 to 500 hr. between overhauls is the yardstick by which we can measure the improvement in aviation engine performance since the close of the war. It is the writer's opinion that about one foot of each yard of the advance is due to improvement in engine manufacture and the balance is due to more intelligent care and operation. The added performance due to improvement in design is available to all purchasers of new equipment but the other and major improvement is only attained in proportion to the efficiency of the operators. Only those operators who appreciate that an aviation engine is not a rock crusher, but that it is as fine a piece of mechanism for its purpose as we know how to produce, get the 500 hours' service. Some have not improved their methods one iota in the past nine years and, in addition to paying for their stagnation out of their own pockets, they are not helping the advance of aviation by their participation in it. Practically all of the engine manufacturers provide their customers with booklets of instructions; but it seems that in many cases the purchaser readily files the information book away without reading until such time as he needs to scan the pages for the part numbers of some parts that he would not have had to order if he had "read and believed." Some of these instructions, cautions, and good advice contained in many of these valuable books as well as some not included are set forth in the following paragraphs.



Type of plate suggested for installation in the plane after initial engine tests are made. It would be of value later when checking the engine before flight.

When a new engine is received the first and most important thing to do is to read the instructions; the second, learn them; and third, put them into practice. These contents will set forth the subsequent steps which will vary with different engines. Generally, the instructions tell how to uncrate and clean the engine. This should be simple and unfraught with danger but too often damages occur. A case in point that recently happened will show that even nice new engines may require considerable repairs before they are run. The engine had been mounted on a tilting stand, with the center of gravity well above the center of rotation. The mechanics were just about to start it rotating, and with no means whatever of stopping it when once it had started. Fortunately a thoughtful individual averted the crisis. Unless men are being employed who have been instructed in the handling of the particular engine being received, a competent foreman should be on the job to supervise its uncrating and its set up. Idle patter; but yet its the stitch that saves nine.

The engine instruction books do not tell you to clean the magneto points, check the valve tappet clearances, and inspect all nuts to see that they are tight and safetied, but this is an essential. The manufacturer is not infallible and oil will get through to the magneto points in shipment.

Assuming that no test stand is available, the next step is the installation. A good cowling should be provided. It will pay for itself in improvement of plane and engine performance. In the case of air-cooled engines, the cowl must assure plenty of air flow over all of the cylinder heads and barrels. Not a few cowls have been installed with the assumption that present day engines could take care of themselves. The cowl should cause as little turbulence as possible. It would seem unnecessary to mention this, but just inspect some poorly cowled plane and imagine all parts that would cause turbulence to be lined up on the wing. It will surprise you. A great deal of improvement can be made in streamlining the engine itself but until this is done, the airplane manufacturer should do his bit with the cowling. In designing the cowling, consideration should be given to the use of the crankcase as an oil cooler if it is to assist in this task.

The fuel system should, of course, be as simple as possible but in many cases it is advisable to complicate it to the extent of having an alternate system that can be used if the main system fails. For gravity tanks an ample head on the carburetor should be provided, under all attitudes of flight. The minimum permissible varies with the carburetor employed and should be ascertained from the engine or carburetor manufacturer. Where a gear type fuel pump is used it is advisable to have the relief valve discharge return to the main tank or go to the gravity tank. By-passing around the pump is very likely to cause it to lose its prime. The gear type pumps will not prime themselves from very much of a suction head and some provision must be made for this purpose. Annealed copper tubing, flexible metal hose, or a combination of the two should be used. In no case should rubber be allowed to come into contact with the fuel. Both the copper tube and the flexible metal hose

should be supported at points close enough to prevent vibration between the supports. Where the fuel line is clipped to two parts that may move relative to each other sufficient length should be used to prevent over-stressing, but, still short enough to prevent vibration. The covering of copper tube with a braid which will hold it in line in case of fracture and yet allow sufficient leakage to detect the start of a fracture has been suggested, and is worthy of thought. Although the carburetors as a rule are provided with strainers, an additional strainer in the line is advisable. It should have a sump to hold water and it should be readily accessible for cleaning. A shut-off cock controllable by a pilot should be provided. This should preferably be as far away from the carbureter as the system will permit, thus affording the maximum protection in case of line breakage. The priming system should be checked for equal distribution with the spray nozzles removed from the manifold.

The remarks made in reference to fuel lines apply also to oil lines. Again rubber should not be used in contact with the fluid. The tank should be mounted so that the oil will flow by gravity to the oil pump. If this is not done difficulty will be encountered in cold weather in getting the oil pump to prime. A good size drain arranged in an accessible position with plenty of clearance below the outlet to accommodate a bucket will save a lot of time for the operating personnel. If an oil cooler is not to be provided, and they should not be necessary with air-cooled engines properly installed, provision should be made for a good air stream passing the tank to aid in cooling. In some cases, it may be advisable to make provision for spraying the return oil on to the inner surface of the tank. This will assist in maintaining the cooling capacity of the tank when it is only partially filled.

The capacity of the oil tank should be proportioned to the fuel supply. In the average case the ratio of fuel consumption to oil consumption is 20 to 1. An extra gallon should be added and then the tank should be made about 10 per cent. larger than the calculated size and the filler so placed that only the calculated amount can be put in. The added space is needed to take care of oil frothing.

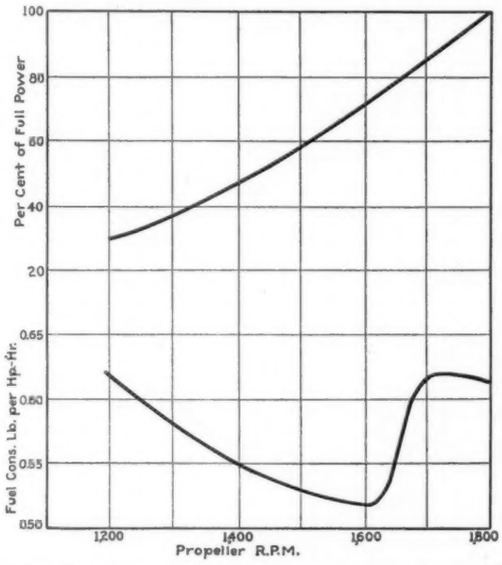
If no provision is made in the engine for an oil thermometer, then one should be provided in the oil outlet line close to the engine. Care should be exercised in getting complete submersion of the thermometer in the moving oil. A pipe "Tee" is satisfactory for this purpose providing that the thermometer is placed in one end and not in the side. If the "Tee" is too large for the thermometer thread only one reducing bushing should be used. That part of the thermometer necessarily out of the pipe should preferably be not exposed to an air blast.

The controls should receive careful attention to see that there is no possibility of their sticking, buckling, coming loose, or throwing over center at any of the bell cranks. The latter should be so arranged that the throttle is not too sensitive in the cruising range. The average throttle will be about half closed for cruising at about 200 r.p.m. under the maximum r.p.m. The controls should always be checked to assure that the full range is available.

It is the opinion of the author that no plane should lack a satisfactory engine starter. The days of "pulling through" are not gone, but they certainly should be. In connection with the starter, a booster magneto or buzzer should be provided and should preferably be operated by the starter. Batteries should not be used in the magneto primary for this purpose.

Planes that are to be used at any time at air temperatures below 60° F. should be equipped with a carburetor air heater unless the throttle is jacketed. Without some source of heat, frost will accumulate on the throttle at temperatures 60° F., especially on a humid day. This will not only cause ragged running but may make it impossible to move the throttle. The oil jackets supplied in some air-cooled engines are not sufficient. A control of the heater may be provided but the author does not consider the complication warranted. Cutting off the heater will raise the power slightly but leaving it on will decrease the fuel consumption.

The last item in the installation, the propeller, does not always get the attention it deserves. Many complaints of rough running have been settled by changing propellers. The propeller should be very carefully balanced and



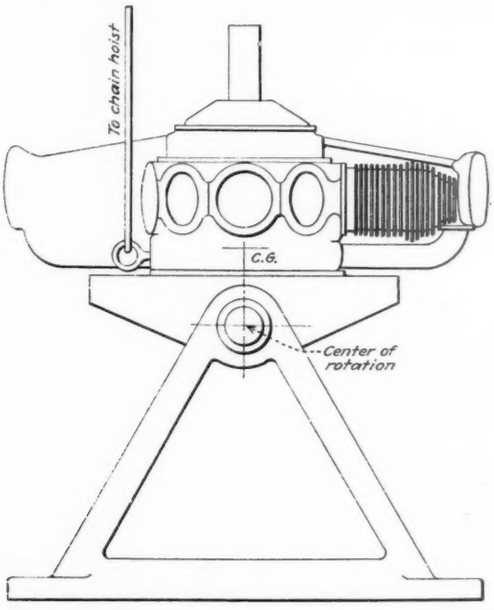
A graphical representation of a not unusual specific fuel consumption curve.

tracked before installation. Normally static balancing is sufficient, but cases have arisen where the dynamic balance was unsatisfactory. The failure of some metal propellers has been traced to the method of drilling for balancing and this should receive careful attention. In addition to securing proper balance it is essential that the pitch of the blades be exactly the same. Any difference in the thrust of the blades will give an unbalanced rocking couple and result in engine vibration.

In starting a new engine the spark plugs should always be removed before the engine is turned over. It should then be turned by hand, slowly, to get the oil out of the cylinders. Before winding up for a start, the controls should be checked for both direction and amount of movement. After starting, all engines, regardless of the amount of running at the factory, should be run in at gradually increasing speeds. A good rule is to run one-half hour at each 200 r.p.m. from idling to full throttle. Care should be taken that the throttle is not full open at 200 r.p.m. under the speed expected as this may cause overheating of air cooled engines. During the run-in the switches should be tried at frequent intervals as fouling of spark plugs is very likely. The switches should also be tried momentarily 200 r.p.m. under full throttle and a note made of the drop on each. The drop does not necessarily have to be the same if the magnetos are wired so that each fires plugs all in one location in the cylinders. If it is not the same this fact is worth knowing right at the start as this may save a lot of worry at some later date. Especially with air-cooled engines, it is not advisable, unless essential, to cut one switch at full throttle. Overheating is very apt to result.

The oil pressure should come up almost immediately on starting off and if it does not the engine must be shut down to find the trouble. Continued running may easily

wreck the engine. The oil should be warm enough to be easy flowing before the speed is increased too greatly The fact that the pressure is up to normal does insure that the engine is getting sufficient oil. After the run-in the engine should be tried several times for both rapid and slow acceleration. The engine manufacturers warn against rapid accelerations and rapid acceleration should not be made if it is possible to avoid it. However, the pilot may sometimes have to jerk the throttle open and the plane manufacturer should assure himself that



A drawing showing the wrong way of mounting an engine on a tilting stand. It will be noted that the center of gravity is above the center of rotation.

when this happens the engine is not going to falter. Normal or slow acceleration must also be tried as it is possible to have poor normal but good rapid acceleration.

After the initial tests are made it would be highly advisable to prepare a plate showing the results and place this in the cockpit. The plate should show the propeller setting, the maximum r.p.m. on the ground, the oil pressure idling and full throttle, and the drop in r.p.m. due to cutting each switch. The latter should state the r.p.m. at which the test should be made. This information will be of inestimable value in checking the engine later.

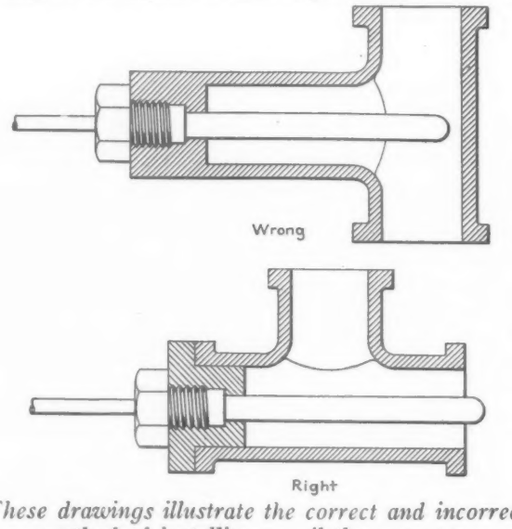
The choice of proper fuels and oils seems to be very little understood. Different engines require different anti-detonating characteristics in their fuels. Probably the best method of determining whether a fuel is satisfactory is to compare it with one that is unquestionably much better than required. If in shifting from this fuel to the fuel in question, there is the slightest drop in r.p.m. or increase in oil temperature it should not be used. Detonation can cause all kinds of grief. If there is any question of doubt about the fuel, send a sample of it to the engine manufacturer for test in his laboratory.

In some of the air cooled engines, grease is used for the rocker arms. A grease with little or no soap should be used as at the temperatures encountered, the lubricant may leave the soap in the grease cup. When this happens with some fittings, the rocker arm may be getting no lubrication when indicating a full cup.

Every operating company should provide its mechanic with a check-off list for inspection purposes. It is the only way to assure that some parts are not overlooked. Where this system has been installed a general reduction in accidents has been accomplished. The list should include every part that needs to be inspected. One list should be provided for the daily inspection and a separate list for inspection after every 25 hr. of operation. At the 25 hr. period, both the fuel consumption and the oil consumption should be checked, a practice not now general. Changes in these values are good indicators of the condition of the engine. One thing that is done and which the author believes should not be done is the changing of the setting of the oil pressure relief valve spring to correct for a drop or increase in oil pressure. Cleaning of the valve is of course all right, but it should be returned with no change in spring tension. If the oil pressure changes, not changes due to change in kind of oil used or change in the oil temperature, something has changed in the engine and changing the relief valve tension does not correct it. The trouble should be located. It is true that ordinary wear may gradually drop the pressure but in such a case the engine will get sufficient oil with the lower pressure, and too much if the pressure is brought back to its initial value. Changing of the relief valve spring tension makes it impossible to use the oil pressure as a gauge of engine condition. Measuring the rate of oil flow though somewhat troublesome, might be very advantageous. Changes in the rate of flow considered in connection with changes in oil pressure are of a very big help in analyzing the engine condition without tearing it down.

In operation too much stress cannot be laid on the necessity of warming up before opening to full throttle. Before taking off, every pilot owes it to himself, his employer, and the industry, to check the engine r.p.m. at full throttle and to try the switches at some speed slightly maximum. Then, as mentioned above, and requested in all engine instructions, the throttle should be opened slowly in taking off. A fast take-off may impress the casual observer, but those who know flying know that some one has to pay for the show.

Probably the greatest item in determining whether you are going to get 50 or 500 hr. between overahuls is the throttling of the engine as soon as you have reached a safe



These drawings illustrate the correct and incorrect method of installing an oil thermometer.

altitude. The difference in the life of an engine at part throttle and the life at full throttle is remarkable. Another very good reason for the throttling of some of the air cooled engines, is that their specific fuel consumption is .6 lb. per hp.h. or above at full throttle, and about .5 lb. per hp.h. at about 200 r.p.m. under maximum. A further reduction in fuel consumption can be obtained by proper use of the mixture control. The mixture control should not be used for low altitude flying at full throttle as overheating may be the result.

AIRPLANE DESCRIPTIONS

Maximum Safety Planes

TWO cabin monoplanes having similar design characteristics, but differing in dimensions and carrying capacity, have been developed by the Maximum Safety Airplane Co., of Los Angeles, Calif. One of these models is a two-place training plane and the other a four-place craft with passengers' cabin located abaft the pilot's cockpit and means of communication provided between the two. Both are powered with Comet seven-cylinder, radial air-cooled engines developing 150 hp. at 1,800 r.p.m.

One of the interesting features in the design is the wide variation between maximum and minimum chord in the wing, resulting in large wing area and low wing loading. Unusually great dihedral contributes to the lateral stability. The pilots' cockpit, which is set ahead and above the wing, is streamlined to a point.

The two-place training plane has an overall length of 34 ft. 7 in., a wing span of 37 ft. 6 in., a maximum chord of 11 ft. and a minimum chord of 6 ft. The weight empty is 1,675 lb. and the gross weight 2,350 lb. The four-place craft has an overall length of 36 ft. 2 in., a wing span of 47 ft. 8 in., a maximum chord of 12 ft. 6 in. and a minimum chord of 7 ft. The weight empty is 1,890 lb. and the gross weight, 2,800 lb.

A speed of 127.5 m.p.h. has been attained with the two-place plane and it is said that the landing speed in tests has been unusually low. During the tests the plane climbed to 1,000 ft. in 1 min. 38 sec.

Conventional wood and steel tube construction is employed in the Maximum Safety monoplanes and all steel used is S. A. E. 1025. Both wood and steel stock is carefully selected and tested before being used in building the planes. The wing is set at an angle of incidence of 0 deg. Control surfaces are somewhat larger than the average.

The two-place "Comet" powered, training plane which is being produced by the Maximum Safety Airplane Co.

The cabin interior is finished in velour and leather upholstery is also furnished. Instrument equipment consists of a panel containing tachometer, altimeter, oil pressure and temperature gauges, air speed indicator, turn and bank indicator, compass, gradometer and clock. Navigation lights also are provided.

Landing gear is of the split type and Gruss shock absorbers are furnished as standard equipment. Bendix brakes and wheels accommodating 30x5 tires also are provided as well as a tail wheel. Provision has been made to install a Heywood automatic starter on the engine and a Westinghouse Micarta propeller included in the equipment.

Crawford Monoplane

A NEW tri-engined plane was recently successfully test flown from Crawford Airport, Seal Beach, Calif., by test pilot Jimmie Angel. The plane was designed by William F. Crawford.

The Crawford Special is a four place, high wing cabin monoplane, wings being tapered in plan form, and thickness, and externally braced. The maximum chord is 7 ft. 6 in., the minimum chord, 3 ft. 6 in. and the wing area 210 sq. ft. The entire plane is constructed of welded chrome molybdenum steel tubing. Power is furnished by three Szekely S-R-3, three cylinder 40 hp. engines.

A front quarter view of the Crawford Special Monoplane powered with three Szekely S-R-3 engines.

The plane has a wing span of 36 ft., an overall length of 22 ft. 6 in. and a height of 6 ft. 9 in. The weight of the craft empty is 1,450 lb. and the gross weight loaded is 2450 lb. During initial test flights this plane showed a speed of about 100 m.p.h. at an engine speed of 1,600 r.p.m., and a cruising speed of 75 m.p.h. It is said to have an initial climb of 1,000 ft. per min., a service ceiling of 15,000 ft., and a landing speed of 35 m.p.h.

The wing construction employs no wire bracing, drag stress being carried by diagonal steel tube members permanently welded in place. The airfoil section of the wing is U. S. A. 34. Wing ribs are spaced 12 in. apart. The leading edge is reinforced 3/32 in. plywood and the trailing edge uses 24 gauge v iron. Tubing throughout the plane is said to be treated with Lionoil inside, and red metal oxide outside, while all covering is with Flightex fabric doped and painted with Berry Bros. products. The tapered wing is built in two panels, each of which is hinged to the fuselage at the upper longeron and braced to the lower longeron by streamlined steel struts. Both dihedral and incidence are zero.

The cabin is unusually wide, pilot being seated in a separate chair forward and passengers in a wide seat across the rear of the cabin.

Propellers are of Crawford manufacture. An innovation is that of carrying the oil tank in the tail just beneath the one piece elevator and stabilizer unit. Fuel tanks are each of 50 gal. capacity, one being carried in each panel.

The landing gear has a tread of 11 ft., and is fitted with Gruss Aero struts and 30 by 5 in. wheels. Aileron and rudder control is conventional, but the usual stabilizer and elevators are replaced by the Crawford patented tail control, a large horizontal surface which is constructed rigidly in one piece and is balanced at the center of pressure about one-third of the chord length back from the leading edge.

Consolidated XPY-1 Boat

THE XPY-1 patrol boat, built for the Navy by the Consolidated Aircraft Corp., Buffalo, N. Y., under a contract awarded as a result of a design competition, was test flown recently and found to exceed all requirements of the Navy. With comparatively a few changes this boat is readily convertible into a commercial transport having accommodations for 32 passengers and including the necessary baggage, radio and lavatory facilities. In its preliminary test flights the XPY-1 indicated a high speed of about 120 m.p.h. and with full military load it took off in approximately 30 sec. and climbed more than 5,000 ft. in 10 min. The service ceiling is expected to be 12,000 ft. The XPY-1 is powered with two Pratt & Whitney geared Wasp engines, and provision is made to install a third when the craft is to be converted for commercial purposes. The XPY-1 is of the externally braced monoplane type and the wing, which has a span of 100

Front quarter view of the consolidated XPY-1 navy patrol boat. Two Pratt & Whitney Geared Wasp Engines are used in this craft.

ft., is built up of two panels and a center section. The chord is 11 ft., 6 in., giving an aspect ratio of nine. The boat has an overall length of 62 ft. and an overall height of 15 ft. It weighs 8,240 lb. empty and has a normal gross weight of 13,500 lb. and an overload gross weight of 16,000 lb.

The hull lines, which were laid down by Capt. H. C. Richardson of the Bureau of Aeronautics, Navy Department, have contributed much to the unusually high efficiency of the hull. It is constructed of 17-ST aluminum alloy shapes arranged in the form of trusses and floor frames, covered by duralumin plating of suitable thickness and divided into a series of watertight compartments by means of bulkheads provided with watertight doors and covers. Two outboard pontoons with ample buoyancy and located about 14 ft. on each side of the hull center line, provide lateral stability. The floatation system is tied into the external wing bracing so that, while the overall span is large, the overhang at the wing tips is less than 1½ chord lengths.

Wings and tail surface structures are built up of extruded 17-ST spars, drag trusses and sheet duralumin ribs and are covered with fabric. The Gottingen 398 airfoil section is employed affording a good combination of maximum L-D and spar depth for a long span. Ailerons are of the balanced type, effective in lateral control and easily operated by means of a wheel. Ample stability, directional and vertical control are accorded by the use of an externally braced monoplane stabilizer, single unbalanced elevator and twin fins and balanced rudders above the stabilizer and elevator.

Engines are suspended in nacelles located beneath the wing and are fitted with two-blade, adjustable pitch propellors, 10 ft. 6 in. in diameter. The main fuel supply is contained in large tanks in the hull from which gasoline is pumped to gravity tanks built into the leading edge of the center section near each engine. Oil is carried in tanks located in the center section over each engine nacelle. The position of the engines and the design of the hull are such that the propellers are clear of the small quantity of spray thrown in planing prior to the take-off.

Further specifications of the XPY-1 are as follows:

Total wing area	110 sq. ft.
Stabilizer area	81 sq. ft.
Elevator area	54.5 sq. ft.
Area of fins	25 sq. ft.
Area of rudders	46 sq. ft.
Wing loading (normal)	12 lb. per sq. ft.
Wing loading (overload)	14.4 lb. per sq. ft.
Power loading (normal, 2 engines)	15.3 lb. per hp.
Power loading (overload, 2 engines)	18.2 lb. per sq. ft.

Buhl Standard Airsedan

ONE of the first airplanes to be tested with the "New Whirlwind Nine" engine is the new Standard Airsedan built by the Buhl Aircraft Co., Marysville, Mich. This craft is a six-place, cabin sesquiplane possessing all of the general design characteristics of other Buhl models. The Wright engine develops 300 hp. at 2,000 r.p.m.

The Standard Airsedan has a wing span of 40 ft., a wing area of 315 sq. ft. and a length of 29 ft. 6 in. The actual weight of the plane empty is 2,450 lb. and the useful load 2,050 lb. The high speed is 145 m.p.h., the cruising speed 115 m.p.h. and the landing speed 45 m.p.h. It has a fuel capacity of 100 gal. and an 8 gal. oil capacity.

Conventional practice is followed in the wing and fuselage construction, the wings being built of wood and the fuselage of welded steel tubing. In appearance the plane resembles other Buhl models having the characteristic nose and relatively smaller lower wing panel. The upper wing is rectangular in plan form and the lower wings are tapered in both plan and thickness, producing panels of almost triangular plan form.

The cabin is entered through doors in the sides of the fuselage and is roomy and comfortable. It is well insulated against temperature and engine noises and heaters are included in the equipment. Instruments include compass, air speed indicator, tachometer, altimeter, clock, and

A photograph of the Buhl Standard Airsedan powered with the Wright "New Whirlwind Nine" engine.

fuel oil pressure and oil temperature gauges. Dual controls also are provided, the throttles being of the Air Corps type. Other equipment includes starter, brakes, metal propeller, navigation lights, fire extinguisher, and fuel strainer and valve.

Excellent visibility from the pilot's position is obtained ahead and down to the sides. The visibility is also particularly good in taxiing because of the position of the engine and the shape of the nose. All panels are made of "Indestructo" glass, those in the front being solid and those in the sides being arranged to slide so that in bad weather the pilot is able to look out into the open.

The plane has demonstrated remarkable rapid take-off and high rate of climb fully loaded. It also has a slow landing speed as shown in the tests.

Develops New Position Finder

OAKLAND, CALIF.—A sextant-like position finder is the invention of H. B. Kastner, former assistant in the department of astronomy at the University of California, and is designed for use on land, shipboard or plane. It is said to have the advantage of practically eliminating mathematical computation in the establishment of latitude and longitude, making it possible to obtain position by direct readings from the instrument. The invention will not replace the common sextant, the inventor explains, inasmuch as it is more costly to manufacture and requires more care and ability to use.

Consider National Tour Plans

DETROIT, MICH.—The 1929 National Air Tour has been tentatively scheduled for October, it was announced here recently. Three routes, one of them including stops in a number of Eastern and New England states, and Canada, are being considered.

Spanish Fliers Span Ocean on Long Flight

BAHIA, BRAZIL.—The big open cockpit biplane powered with a 500 hp. Hispano-Suiza engine carrying the Spanish pilots, Capt. Francisco Jimenez and Capt. Ignacio Iglesias, landed here March 26 after a flight of 4,200 mi. from Seville across the South Atlantic by way of Northern Africa, the Cape Verde Islands and Natal, Brazil. About 2,400 mi. was over open water.

They were reported over Cape Verde at noon March 25 and over Natal soon after 2.30, their time, on the morning of March 26. The distances are: about 1,200 mi. from Seville to Cape Balnco, North Africa; about 2,400 mi. from there to Natal and about 1,200 mi. from Natal to Rio De Janeiro, the goal of the flight. A retractable radiator enabled elimination of considerable air resistance. The plane carried 1,000 gal. of gasoline and 50 gal. of oil. The loaded machine weighed about 10,000 lb.

The flight ended a little short of the record, it was reported.

Faunce Adds Aero Department

PHILADELPHIA, PA.—John H. Faunce, Inc., this city, customs broker and freight forwarder, has established an aviation department. The company has already signed contracts, it is announced, with several American and foreign airlines, for which they will act as representatives. The executive offices are located in the Public Ledger Building, Independence Square, Philadelphia, Pa., with a branch office at 8-10 Bridge Street, New York City.

Buffalo's Own Products Feature Successful Show

Many Space Applications Refused; New Atlantic Flight for Friendship Reported

BUFFALO, N. Y.—Ensconced in the huge, pillarless drill shed of the 106th Field Artillery Armory, this city's first aviation exhibit was revealed to the public for the first time Saturday night, March 23. Thirty-six planes equipped with engines were on the floor, 13 engines occupied their own display stands along the side, while scores of accessory and allied interests of every variety were on hand, also. Visitors from "Missouri" who wished to see the machines actually perform the characteristics ascribed to them were able to inspect about 15 demonstrator planes at the airport. The management reported, also, that space at the armory was refused to about 71 applicants on account of lack of room. The show was opened by Governor Roosevelt at Albany by turning on the Armory lights.

One of the announcements heard during the show was to the effect that the Friendship is scheduled to make another good will trans-Atlantic flight within the next three months. Considerable secrecy has surrounded the plans, part of which, including the name of the pilot, were to be divulged during the week.

One of the pleasing features from the point of view of exhibitor or spectator was the excellent housing of the display. Not a post, girder or partition existed to interfere with handling the planes or placing them in the most advantageous positions for observation and inspection by the public.

Big Planes Prominent

The planes were stationed on the rectangular drill floor, most of the machines being shown in flying position, while the accessory, engine and other exhibits formed an excellent background along the four walls. Surmounting the entire group, at the opening, was the new Ford tri-engined (Wasps) transport although its central position was due to be shared by the famous Friendship, which had arrived at the local airport by air and was awaiting transfer to the Armory.

While the management was proud of the fact that the show was in effect a national exhibit in that planes were contributed largely by the manufacturers themselves, there was a great deal of pride in the volume of the contributions which originated in the local factories. In fact, the displays arranged by the local manufacturing units of the industry may be said to form the spear point of the entire show, without detracting from the interest of the other exhibits.

Curtiss Has Big Display

Chief of the local exhibitors was the Curtiss Aeroplane & Motor Co. which was very generous in number and quality of exhibits. Two machines, a Falcon and a Hawk, built for the Chilean air force, an uncovered fuselage of a Falcon that provided intimate inspection of the vitals of

(*Turn to page* 971)

Engine Cooling Fluid Developed by Army

WASHINGTON, D. C.—Operation of water cooled engines is expected to be revolutionized through a new cooling process developed under Brig. Gen. William E. Gillmore, chief of the Materiel Division, Wright Field, Dayton, O., it is announced here. A chemical in liquid form, the constituents of which may be purchased in the open market at reasonable prices, is to offer a number of advantages in taking the place of water for cooling, if expectations prove true.

Engineers at Wright Field, having conducted numerous block tests on standard pursuit plane power plants, state that the economy promised will be a distinct step forward. But four and one-half gallons of chemical, it is said, will be needed as compared with some 18 gal. of water—a weight reduction of some 84 lb. Use of a much smaller radiator—one that may be placed within the wing—will bring another saving of some 40 lb.; and with this combined weight saving comes a corresponding increase in pay load as well as higher speeds through lessening of parasitic resistance by use of the smaller radiator.

The new fluid, furthermore, boils at 387 deg. Fahrenheit rather than 212 as in the case of water, and this enables higher speeds without menace of boiling cooling fluid.

F. Trubee Davison, assistant secretary of war for aviation, announces the important discovery will not be kept a secret, but that full details will probably be announced shortly. Flight performance tests are now planned.

Wilkins Praises Mobiloil B

NEW YORK, N. Y.—At a luncheon of the Bankers Club here March 22, given under the auspices of the Vacuum Oil Co., Sir Hubert Wilkins, polar flier, prefaced his remarks by attributing much of his success to the cooperation of that firm and its products, particularly Mobiloil B lubricant, which according to his declaration, he found admirable under the extreme conditions of excessive cold. Sir Hubert Wilkins used a Wasp powered Lockheed Vega recently in making the first Antarctic airplane flight from Deception Island.

Announce Detroit Aviation Program

Many Special Conferences Planned; Aero Leader to Read Papers

DETROIT, MICH.—The official program of Aviation Week—the period of the Second All-American Aircraft Show, April 6-14—has now been announced as follows:

Saturday, April 6—12.00 Noon, air parade, First Pursuit Group, Selfridge Field, Naval Reserve and National Guard. 7.00 P.M., Official opening of All-American Aircraft Show at Convention Hall.

Sunday, April 7—Exposition open at Convention Hall from 10.00 A.M. until 10.30 P.M. 1.00 P.M., Berry Brothers aviation luncheon, Chateau Voyageurs, Grosse Isle.

Monday, April 8——Boy Scout Day and Industrial Night. 10.00 A.M., Commercial airplane manufacturers section meeting, Book-Cadillac Hotel. 10.00 A.M., Inter-Collegiate Aviation Society Section, Statler Hotel. 12.15 P.M.—Central Kiwanis Club, General Motors Building. 12:15P.M., U. & I. Club, Detroit Leland Hotel, Paul Litchfield, "Lighter - Than - Air Craft." 12.30 P. M., Windsor Rotary Club, Prince Edward Hotel, Porter Adams, "Speed Contests to Develop Commercial Aviation." 12.15 P.M., Typothetae-Franklin Association, Fort Shelby Hotel. J. Don Alexander, "The Western Aircraft Market." (The Detroit Photo Engravers and the Weekly Luncheon Clubs combine in this meeting). 8.15 P.M., Detroit Yacht Club. Col. Paul Henderson, "Air-Rail Travel." 8.15 P.M., Detroit Flying Club, Book-Cadillac Hotel. C. S. "Casey" Jones, "Regulations for Flying Schools."

Tuesday, April 9—Engineers' Day Service Club Night. 10.00 P.M., Standardized Performance Testing Committee, Book-Cadillac Hotel. 10.00 A.M., Commercial airplane manufacturers section meeting, Book-Cadillac Hotel. 10.00 A.M., Society of Automotive Engineers, Book-Cadillac Hotel.

10.00 A.M., Inter-Collegiate Aviation Society session, Statler Hotel. 2.00 P.M., Joint Technical Meeting, Aeronautical Chamber of Commerce and Society of Automotive Engineers, Book-Cadillac Hotel. 6.30 P.M., Aircraft Banquet, Grand Ballroom, Book-Cadillac Hotel. 12.15 P.M., Co-operative Club of Detroit, Detroit Leland Hotel. 12.15 P.M., Grand River Improvement Association, Bird Arcade. F. Trubee Davison, "Record Making Army Flights." 12.15 P.M., Kiwanis Club No. 1, Statler Hotel. 12.15 P.M., Windsor Kiwanis Club, Prince Edward Hotel. Colonel H. H. Blee, "Highways of the Air." 12.15 P.M., Civitan Central Club, General Motors Building. Ivan Briggs, "Baby Airplanes in commerce." 12.15 P. M., Downtown Lions Club, Statler Hotel. 12.20 P.M., Sojourners Club, Book-Cadillac Hotel, Gen. Frank P. Lahm, "International Balloon Racing." 2.30 P.M., Cass Technical High School Auditorium. Presentation of prizes for Junior All-American Aircraft Show. Gov. Fred W. Green, Harvey J. Campbell, "Casey" Jones.

Wednesday, April 10.—Michigan Day and Commerce Night. 10.00 A.M., Society of Automotive Engineers section, Book-Cadillac Hotel. 10.00 A.M., National Gliders' Conference, Statler Hotel. 2.00 P.M., Society of Automotive Engineers session, Book-Cadillac Hotel. 6.30 P.M., S.A.E. Aeronautic Committee dinner, Book-Cadillac Hotel. 6:30 P.M., National Glider Association dinner, Detroit Athletic Club. 12.15 P.M., Civitan Club, Book-Cadillac Hotel. Charles L. Lawrance, "Record Performances of the Wright 'Whirlwind.'" 12.15 P.M., Conopus Club, Book-Cadillac Hotel. Thomas Halpin, "The All-Metal Plane." 12.15 P.M., Northwest Kiwanis Club, Ionic Temple, A. J. Edwards, "Commercial Aviation in the Southwest." 12.15 P.M., Up Town Lions Club, Wardell Hotel. Clyde Cessna. 12.15 P.M., East Detroit Lion's Club, Whittier Apartments. Maj. Ralph Royce, "Every Day Army Flying." 12.15 P.M., Northwest Detroit Lions Club, Sally Lunn Tea Room. B. Russell Shaw, "Planning a Municipal Airport." 12.15 P.M., Mercator Club, Book-Cadillac Hotel. Edgar Gott, "The Future of the Amphibian Plane." 12.15 P.M., National Town and Country Club, Detroit-Leland Hotel. Wm. P. MacCracken, Jr., "The Department of Commerce in American Aviation." 12.15 P.M., Optimists Club, Book-Cadillac Hotel. Prof. Herbert Sadler, "Universities of the Air." 12.15 P.M., Progressive Lions Club, Tuller Hotel. Lester Seymour "Air Traffic Promotion." 12.15 P.M., Rotary Club, Statler Hotel. Maj. Reed Landis, "Motorless Flying." 12.15 P.M., Vortex Club, Detroit Leland Hotel. Prof. Alexander Klemin, "The Guggenheim Foundation for Aeronautics." 6.30 P.M., Detroit Real Estate Board, Book-Cadillac Hotel. W. Irving Glover, "Flying the Air Mail."

Thursday, April 11—Women's Day and International Night. 10.00 A.M., Flying School Committee, Aeronautical Chamber of Commerce, Book-Cadillac Hotel. 6.30 P.M., Border Cities Banquet, Prince Edward Hotel, Windsor, Ontario 12.15 P.M., American Business Club, Book-Cadillac Hotel. Ralph Irwin. 12.15 P.M., Caravan Club, Masonic Temple. Frank Tichenor, "The Government's Place in Aviation." 12.15 P.M., Southwest Kiwanis Club, Western Y.M.C.A. D. H. Hollowell, "Mass Production of Aircraft." 12.15 P.M., Knights of the Round Table, Book-Cadillac Hotel. Lawrence LePage, "The Development of Eastern Air Traffic." 12.15 P.M., Women's Aeronautic Association, Detroit Yacht Club. Miss Amelia Earhart, "A Woman Flies." 6.30 P.M., Council of Exchange Clubs, Masonic Temple. Dr. Geo. W. Lewis "Aeronautic Research."

Friday, April 12—Army and Navy Day. 10:00 A.M., Flying School Conference, Aeronautical Chamber of Commerce, Book-Cadillac Hotel. 12.15 P.M., Adcraft Club, Statler Hotel. Glenn Curtiss, "25 Years of Air Progress." 12.15 P.M., Gyro Club, Imperial Hotel. Walter Davis. 12.15 P.M., Laymen's Club, Tuller Hotel. General W. E. Gillmore, "Laboratories of the Air."

Saturday, April 13—Fraternal Day.

Sunday, April 14—Exposition open at Convention Hall from 10.00 A.M. until 10.30 P.M.

The exhibition will be open from 10.00 A.M. until 10.30 P.M. daily. All children, 16 yrs. of age and under will be admitted at the reduced rate of 25c every day from 10.00 A.M. until 5.00 P.M.

Music furnished through the courtesy of "Graham-Paige Band, the Combined High School Bands, the Letter Carriers' Band, the Shrine Band, the University of Detroit Band and the Masonic Temple Band.

Purse Offered Women Fliers

WICHITA, KAN.—Marcellus M. Murdock, president of the Wichita chapter of the National Aeronautic Association, announced at the first annual dinner party of the Wichita Women's Aeronautic Association that the first member of the latter organization to establish a cross-country flight record for women will get a purse of $5,000. Mr. Murdock pledged himself a $500 subscription toward the $5,000 purse and promised to see that the remainder was raised among the N. A. A. membership.

Woman to Try for Record

DETROIT, MICH.—An attempt to break the woman's endurance flight record will be made at the All-American Aircraft Show here by Miss Jean LaRene of Chicago.

Miss LaRene is training for the event at the Marshall Flying School at Marshall, Mo. She will fly a Barling NB-3.

Aviation Corporation Planning Purchases

NEW YORK, N. Y.—With the announcement that its aquisition of control of the Universal Aviation Corp. is practically assured and that negotiations for securing control of the Fairchild Aviation Corp. have gone far, The Aviation Corporation of this city has taken its first steps in the development of its program as a development and holding organization in the aeronautical industry.

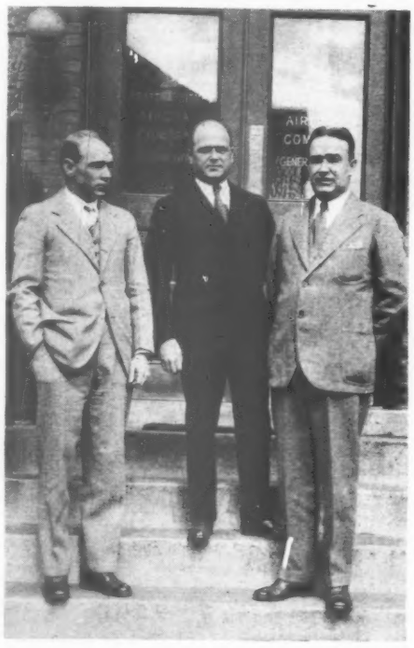
Enough support among the Universal stockholders of the proposed exchange of stock between the two groups has been assured to make that plan almost a certainty, according to Graham B. Grosvenor, president of The Aviation Corp. The transaction must be completed by May 20. It will involve all the Universal interests which includes Robertson Aircraft and other subsidiaries.

A similar move is being proposed for Fairchild, but the details have not been announced. The Fairchild organization is itself a holding concern involving the Fairchild Airplane Manufacturing Corp., Fairchild Aerial Camera Corp., Fairchild Aerial Surveys, Inc., and Fairchild Flying Corp.

Kinner Eagle Gets No. 124

KANSAS CITY, MO.—Approved type certificate No. 124 has been granted the 100 hp. Kinner powered American Eagle biplane, according to reports here.

With P. & W.



Showing (left to right) L. S. Hobbs, A. V. D. Willgoos, and Don L. Brown, new directors of the Pratt & Whitney Company. Mr. Brown has been named vice president in charge of manufacturing.

Keeps Cost Account Of Light Plane Flying

NEW YORK, N. Y.—In an effort to determine the exact cost of operation of a light sport plane, William H. Hooker of Bayside, L. I., owner of an Avro Avian, kept a record of gasoline, oil and maintenance expenditures for a period of five months.

During that time, the Avian, which will be built in this country by the Whittelsey Manufacturing Corp. of Bridgeport, Conn., consumed 393 gal. of gasoline and 5½ gal. of oil. The total flying time was 79 hr. and 29 min. and the ground time was 24 hr. and 17 min. For miscellaneous repairs and materials incidental to upkeep, the owner spent $41.84.

Upon the basis of 90 m.p.h. for an average speed, it is computed that the plane was flown 7,165 mi. during the period over which the record was made.

Name A. C. of C. Governors

NEW YORK, N. Y.—Edgar N. Gott, president of the Keystone-Loening Aircraft Corp., Bristol, Pa., Walter H. Beech, president of the Travel Air Manufacturing Co., Wichita, Kan., and Charles J. Brukner, president of the Advance Aircraft Co., Troy, O., were elected governors of the Aeronautical Chamber of Commerce at a meeting held in the offices of the Chamber here March 19th. They were elected to fill the vacancies left on the board due to the resignations of Lester D. Gardner, president of Aeronautical Industries, Inc., Paul Henderson, vice president of T. A. T., and C. L. Lawrance, president of Wright Aeronautical Corp., who now become members of an advisory body established by the members of the Chamber at the last special meeting known as "The Council."

Change Engine Test Regulation

WASHINGTON, D. C.—Air Commerce Regulations, paragraph 10 (e) Page 6, concerning power plant tests, have recently been changed to read as follows: "The 50 hr. endurance test shall be run in 10 five-hour periods. During the first five hours the engine shall be run with the throttle wide open, the speed being at least equal to the rated speed specified by the manufacturer. The power rating of the engine will be based on the average horsepower developed during this first period. During the remaining nine periods the engine shall be run at approximately 97 per cent of the rated speed and the horsepower developed should at no time be less than nine-tenths of the rated horsepower."

Seek Lockheed Assembly Plant

DETROIT, MICH.—Negotiations are under way to bring the eastern assembly plant of the Lockheed Aircraft Co. of Los Angeles, Calif., to this city, according to Edward F. Schlee of the Schlee-Brock Aircraft Corp., mid-west and southern distributors of the Lockheed products. If the proposal succeeds, additional units will be added to the $40,000 steel and brick hangar now being built.

Army Aircraft Data Reported

WASHINGTON, D. C.—It is reported here that a total of 542 planes constructed under the aircraft building plan were delivered to the Army Air Corps in 1928. During the year, 393 airplanes were contracted at a cost of $5,174,245. Of these, 155 were observation, 47 bombing, 8 cargo, 120 training, and 63 pursuit planes. For the fiscal year 1929, $13,342,445 was appropriated by Congress for airplanes for the regular Army and $194,097 for the organized reserves.

Elias Now Organizing New Aircraft Concern

BUFFALO, N. Y.—G. Elias & Bro., Inc., is organizing the Elias Aircraft & Manufacturing Co. to build sport and military type monoplanes. A new factory will be built adjoining the Buffalo airport, where the Elias Aircoupe and Airsport will be constructed. These planes, it is reported, will sell for $2,800 to $3,500 and with the Elias-Cato engine for $2,400.

The Elias Aircoupe is a cabin machine, while the Elias Airsport is a craft readily convertible to either open or closed type. J. L. Cato, chief engineer and former member of the Army Air Corps, is building the aircraft for the Elias company.

The new plant will have approximately 127,000 sq. ft. of floor space and will have a capacity of 30 airplanes a month. The Elias-Cato engine is a four cylinder, 80 hp. air cooled power plant.

Engine Oil Annonnced

NEW YORK, N. Y.—A new aircraft engine oil—Gargoyle Mobiloil Aero "H"—is announced by the Vacuum Oil Co. The announcement says extensive research and severe tests were carried on for many months in its development and perfection. Mobiloil Aero "H" is especially manufactured for use under the severe heat and pressure conditions imposed by long distances, heavy loads and continuous operation at high speed. Its outstanding features are said to be exceptional lubricating ability under high temperatures, freedom from carbon in the makes and types of aircraft engines for which it is recommended and unusually low consumption per horsepower hour.

New SKF Branch Offices

NEW YORK, N. Y.—SKF Industries, Inc., 40 East 34th Street, this city, announces that the Buffalo, Detroit and San Francisco district offices of the company are now located in new headquarters to better serve SKF customers. The Buffalo office has moved from 517 Manufacturers and Traders Building to Main and Genesee Streets; Detroit from 6520 Cass Avenue to 2820 East Grand Boulevard; San Francisco from 115 New Montgomery Street to 221 Eleventh Street.

Sport Wacos for Federalists

BROWNSVILLE, TEX.—Four Sport Wacos have been delivered here by pilots representing the Garland Aircraft Corp. of Tulsa, Okla., to Mexican army fliers.

Chamber Show Group Headed by Rentschler

NEW YORK, N. Y.—F. B. Rentschler, president of the United Aircraft and Transport Co. and of the Pratt & Whitney Aircraft Co., was elected president of the Aeronautical Exposition Corp., a subsidiary of the Aeronautical Chamber of Commerce which handles the official aircraft shows for the industry, at a recent meeting here.

J. C. Hunsaker, vice president of the Goodyear-Zeppelin Corp., was elected vice president, S. S. Bradley, vice president and general manager of the Aeronautical Chamber of Commerce was elected to the same offices in the Expositions Corp. Luther K. Bell and Owen A. Shannon were elected secretary and treasurer, respectively.

An executive committee consisting of Mr. Rentschler, Charles L. Lawrance, president of the Wright Aeronautical Corp., F.H. Russell, vice president of the Curtiss Aeroplane & Motor Co., C. H. Colvin, president, Pioneer Instrument Co., and S. S. Bradley were appointed.

Travel Air May Have Albany, N. Y., Branch

WICHITA, KAN.—If present negotiations between the Travel Air Manufacturing Co. of Wichita and city officials of Albany, N. Y., go through, a branch factory of the Wichita company will be opened at Albany.

Travel Air's proposal is for Albany to build a modern factory to cost at least $50,000 on the municipal airport there. Travel Air will pay an annual rental sufficient to handle the interest on the bonds and to retire the bonds within 20 yrs.

O. G. Harned, Travel Air sales superintendent in the East with headquarters at Albany, is handling negotiations for Travel Air and G. A. Reilly, corporation counsel, is handling the deal for the city. Negotiations were opened two months ago. The Albany branch is one of several planned.

Command-Aire Tests Engines

LITTLE ROCK, ARK.—In exhaustive tests recently conducted at Command-Aire Field with three types of planes equipped with Hisso, Warner, and Curtiss OX-5 engines, the following average speeds were disclosed:

Rate of Climb (at sea level)			
Curtiss	OX-5	90 h.p.	550 feet per minute
Hisso		150 h.p.	625 feet per minute
Warner		110 h.p.	650 feet per minute
Top Speeds			
Curtiss	OX-5	90 h.p.	104 m.p.h.
Warner		110 h.p.	112 m.p.h.
Hisso		150 h.p.	120 m.p.h.
Landing Speeds			
OX-5		90 h.p.	32 m.p.h.
Warner		110 h.p.	30 m.p.h.
Hisso		150 h.p.	35 m.p.h.

Order Nine Ryan Broughams

ST. LOUIS, MO.—The Mahoney-Ryan Aircraft Corp., this city, has received an order for five Brougham planes powered with the Wright J-6 engines from Val Zimmermann of Midwest Airways, Inc., Milwaukee. An order for four J-6 Ryan Broughams has been given, furthermore, by O. M., "Red" Mosier of Lloyd-Mosier Air Commerce, Colorado Springs, Colo.

Add New Firms To Wichita List

Braley; Swift, Watkins and Okay Concerns Plan Plane Production

WICHITA, KAN.—Early summer will see four more Wichita aircraft factories in commercial production, if present plans are carried out.

The Braley Aircraft Co. is now building a new factory on the 310 acre airport of the Braley School of Flying and expects to get into production by May 1. The original plane has passed its air tests and only a few changes will be made. Several types of craft will be built, according to Thomas Braley, president.

Braley training planes will be powered with the 90 hp. LeBlond, a two-seat sport will have Warner power, and a three place biplane will carry either Challenger or Whirlwind power. The Braley School of Flying, headed by Ted Braley, son of Thomas, will take the first 10 planes.

The Swift Aircraft Co., organized more than a year ago to build a fast two place biplane, and which spent the past year experimenting, will start commercial production in its new factory, soon after the close of the Detroit show, according to A. J. Edwards, general manager. The first new model, developed for the Detroit show, has been tested and found to meet requirements.

One Swift Plane a Week

The sport plane with Kinner engine made 110 m. p. h. With Wright power of 150 hp. the plane is expected to do 135 m. p. h. Two new models, built along the same lines but with different power and for a different class of buyers, will be completed and tested in time for the Detroit exposition. The Swift production schedule calls for one plane a week.

Commercial production of the new low wing monoplane brought to Wichita by E. A. Watkins and associates from Minneapolis, will begin immediately after the Department of Commerce issues an approved type certificate. Only minor changes will be made in the original model, which has been subjected to severe air tests.

The new plane, which will not be named until production starts, has a cruising speed of 75 m. p. h. and a top speed of 80 m. p. h., using a three cylinder engine of 40 hp.

Designed by Cumming

The wing span of the plane is 37 ft. and the length is 23.5 ft. The craft weighs 725 lb. without power plant and will carry a useful load of 480 lb., according to reports. W. C. Cumming designed the new plane to be manufactured in Wichita. Associated with Mr. Watkins are J. H. Turner, N. G. Warsinske and Hollis Bridgeman, all of Wichita.

At the annual meeting of stockholders of the Okay Aircraft Corp., with a big factory near Muskogee, Okla., but with headquarters in Wichita, directors announced the building in Wichita of a three place low wing cabin type monoplane. This type will be manufactured in Wichita, with the Oklahoma factory devoted to transport and multi-engined machines.

Kinner engines will be used in the small type, directors of the company announced. All Okay products will be distributed from Wichita. The Okay board of directors is composed of C. N. Martin, president; Earl A. Bidwell, vice president; Dan L. Jones, secretary-treasurer, all of Wichita, and M. O. Leach, Augusta, Kan. and L. G. Richardson, Arkansas City, Kan. W. P. Sullivan is chief engineer of the company.

Study of Questionable Advertising Underway

NEW YORK, N. Y.—Frank Tichenor of *Aero Digest* and Earl D. Osborn, editor of *Aviation*, have been elected chairman and vice chairman, respectively, of a general committee formed by the Publishers' Section of the Aeronautical Chamber of Commerce to investigate questionable aeronautical advertising at a meeting held here recently.

A sub-committee on investigation with the following members was appointed: Ralph Duysters, *Airway Age*, chairman; Harley W. Mitchell, *Aeronautics*, vice chairman for the Middle West; Robert J. Pritchard, *Western Flying*, vice chairman for the Pacific Coast; L. A. Nixon, *Air Transportation* and Harry Schwarzschild, *Airports*, members-at-large.

The members of the committee pointed out that the formation of the questionable advertising committee was a preventive rather than a corrective measure and stressed the importance to the development of the industry in having a medium through which advertising appearing doubtful as to facts could be checked. Cooperation on the part of advertising managers and advertising agencies will be sought.

Arkansas Firms Merge

FORT SMITH, ARK.—Consolidation of Fort Smith's two aviation firms into one concern with a capital of $50,000 has been announced. The flying field of the Ozarks Airways Co., near Moffett, Okla., just across the Arkansas River from Fort Smith, will be further developed and the Fort Smith Aircraft Co. field will be abandoned. A. Graham Williams, Jr., and Wendell Robertson, both wartime pilots who are leaders in aviation at Fort Smith, are among the principals in the deal. Capt. Ollie Blan, managing pilot of the Fort Smith Aircraft Co., will share duties with F. H. Muncie, managing pilot of the Ozarks Airways.

To Make Endurance Attempt

NEW CASTLE, DEL.—Capt. George M. Haldeman, chief test pilot of the Bellanca Aircraft Corp. here, will make a new attempt at a world's flight endurance record shortly, it is announced. He will use the stock model Bellanca CH in which he recently made the first non-stop flight from Canada to Cuba.

Lincoln Aircraft Buys Rights for Morehouse

OMAHA, NEB.—Purchase by the Lincoln Aircraft Co., Inc., of the exclusive right to manufacture, use and sell the Morehouse engine, one of the first small airplane power plants ever developed, was announced by Victor Roos, president.

The transaction was completed, Mr. Roos said, through the Wright Aeronautical Corp. of Paterson, N. J., sole owners of the engine. He declined to reveal the consideration.

The Moorehouse engine, he explained, is a 30 hp., two cylinder plant, developed for use in smaller type planes. It will be used exclusive in the Lincoln company's one or two seater training plane. It will be made at Lincoln.

Developed about five years ago, Mr. Roos said, the engine was temporarily shelved by the Wright company because of the demand for the larger and heavier type power plant. The smaller engine, he said, under severe test at McCook Field, had developed 80 m.p.h., with a limited gasoline consumption of 32 mi. to the gallon.

The Lincoln company's rights to the newly acquired power plant extend also into Canada, Mr. Roos said.

Organize Strong Aero Finance Firm in West

LOS ANGELES, CALIF.—Formation of the Aircraft Finance Corp. of America, with a capitalization of $30,000,000, and offering a complete financing service to the aviation industry, has been announced in Los Angeles by A. O. Hunsaker, president of the Consolidated Finance and Holding Corp. The new company is a California corporation with head offices in Los Angeles. It is planned to open a branch office at once in Chicago and to qualify for business in 10 states other than California. The new company plans to finance aircraft and engine manufacturers, distributors and dealers, and later plans to control several aviation factories and air transport lines.

Officers of the Aircraft Finance Corp. of America are: A. O. Hunsaker, president; O. K. Hunsaker, secretary and treasurer; Carroll L. Post, chairman of the board of directors.

Hawiian Companies May Unite

HONOLULU, T. H.—Hawaiian Airways, Ltd., a commercial concern now being organized in the Islands, is negotiating with the Inter-Island Airways, Ltd., relative to a consolidation of the two companies. Capt. Lowell H. Smith, commander of the Army World Flight, has been prominently mentioned as the probable general operating manager of Hawaiian Airways. In the event of the proposed merger, however, it is not considered likely that Captain Smith will become affiliated with the concern and, in the meantime, he has been ordered to report for duty as Air Corps representative at the Buffalo Curtiss firm.

BRIEFLY—

William H. Mallon Co., Inc., aviation engineers, is now located at 285 Madison Avenue, New York City, having removed to larger offices to care for increased activities.

Towed gliders will be used for anti-aircraft targets in practice planned at Fort Story, Va.

According to Edward P. Howard, chief of the Air Regulations Division, variable baggage, fuel, oil, and special equipment loads may be carried in planes built under approved type certificates under condition that the alterations in construction bringing the variation are supported by proper drawings and analysis submitted to the Engineering Section.

Aircraft Manufacturing Corp., Pasadena, Calif., has turned out an experimental monoplane designed by Maj. S. C. Parr, formerly with the Douglas firm. The craft carries six passengers and two pilots. It is powered with a J-5 and uses the N. A. C. A. cowling.

Twin-engined planes are planned by the Commercial Aircraft Corp., considering establishment of a factory near Rockville, Md.

Experimental flights with the Dare variable camber all metal low wing monoplane have begun at Detroit. The plane is the third of the type to be built by Melvin E. Dare, who has studied the variable camber principle for many years.

A three-engined four place cabin monoplane to be known as the "Triad" is to be put into production at Carroll, Ia., it is reported, by the newly-formed Saul Aircraft Corp.

With more new planes ordered, the Pan American Airway fleet will total 58 craft representing an investment of $2,500,000.

T. A. T. has ordered five additional Wasp engines from the Pratt & Whitney Aircraft Co.

During the first nine months of 1928, but 36 planes valued at $89,223 were imported, whereas American manufacturers exported 162 planes valued at $1,759,653.

Lieut. Joe T. Shumate, Arkansas National Guard, reports an endurance flight in primary training plane of 11 hr. 4 min.

Bureau of Standards tests indicate the possibility of practical sound-proofing of cabins.

Curtiss Flying Service plans to open a large aircraft show room on 57th Street, New York City.

Stout Air Services, Inc., and the Detroit and Cleveland Navigation Co., it is now officially announced, have joined forces to form the Stout-D. & C. Airlines, Inc., for a combination steamer and Dornier Wal flying boat service on the Great Lakes. A. A. Schantz has been named president of the company.

Two Whirlwind powered Ryan M-2 monoplanes are being equipped dusting work on the West Coast.

The Detroit Balloon Club announces it will have two entries in the National Elimination Balloon Races.

Harold F. Pitcairn, president of Pitcairn Aviation, Inc., is sailing to England for a series of conferences with Juan de la Cierva, Autogiro designer. Perfection and production of the machine for manufacture in America will be the subject, the Pitcairn organization having recently acquired the American rights to the invention.

Equitable Aircraft Sales Corp. of Roosevelt Field, is the name of the organization which recently signed a distributor contract with the Hamilton Metalplane firm. The name "Seaboard Aircraft Co.," first chosen, was discarded.

The Cockpit, a clubroom for local and visiting pilots, has been provided by the Robert Treat Hotel at Newark, N. J.

A $500,000 aviation country club which will have its own hangars, club house and flying field is being organized at Los Angeles.

Beacon Airways of America, Kansas City, has opened a used plane department, specializing on trading in old machines for new ones.

It is understood that Interstate Airlines, Inc., is negotiating for the transfer of its headquarters from Chicago to Evansville, Ind.

Contracts have been let for a 225 by 80 ft. hangar at the Los Angeles Metropolitan Airport to be occupied by a company planning to produce the "Sunbeam," a six place cabin biplane powered with a J-6.

Two Oregon-built planes were tested recently. One is a parasol three place monoplane powered with a Ryan Siemens built by Lee Eyerly of Salem. The other is a full cantilever wind, three place cabin monoplane with Anzani engine built by Roy Davis of the National Aircraft Corp. of Beaverton.

Arrangements have been made to include Clearwater, Fla., in the southeastern air mail service.

John Henry Mears is reported to be making plans to lower his own record of 23 days 15 hr. 8 min. around the world this summer.

Pan American Airways is pushing negotiations with the governments of Brazil and Argentina relative to the establishment of a second South American air transport service, this one to be operated along the east coast of the continent.

Trade Tips

It Has Been Reported That—

—Jerome A. Waterman of Tampa, Fla., has received his pilot's license and expects to purchase a new plane sometime in June.

—Sidney Brown of Lakeland, Fla., newly-appointed collector of customs at Tampa port, will use an airplane in connection with his duties and will take flying lessons before purchasing a plane.

—Tentative plans for the Colorado Springs Municipal Airport, Colorado Springs, Colo., have been approved, and bids for construction of the project will be called for soon, according to A. M. Wilson, city manager.

—L. B. Enzminger, North Platte, Neb., has been granted a 10 yr. lease on a portion of the municipal airport for erection of a hangar, airplane repair shop, and for the sale of fuel and oil. It is said that Enzminger will put $60,000 into the project.

—Otto Praeger, former second assistant postmaster general and now postmaster general of Siam, informs the Aeronautical Chamber of Commerce that he believes there is an interesting market developing for aircraft in that country. The American importing firm of International Engineers, of which Herman F. Scholtz is president, has been recommended. The concern is located at Bangkok, Siam.

—Roger W. Babson has leased 300 acres of land near Walk-In-Water Creek, south of the Vero Beach Highway, to the Lake Wales Chamber of Commerce for an airport. Forty acres are being cleared at once. A hangar is to be built and lighting facilities installed.

—Walter Miner plans establishment of an airport at Marshfield, Wis. He will build a hangar to house his Waco plane.

—Development work is to start, it is reported, on the 214 acre site chosen for the Olympia, Wash., municipal airport.

—Bids on construction of an 80 by 100 ft. hangar are being taken by Wings, Inc., of Shreveport, La. Howard E. Noble is president.

—H. F. McElroy, city manager of Kansas City, Mo., will soon take bids on construction of airport station at the Kansas City Airport, to cost about $35,000.

The Real Estate Investment Co. is having plans prepared for a transient airplane hangar to be erected at the Grand Central Air Terminal, Glendale, Calif., to cost about $40,000.

—The Arizona Airways, Inc., will erect hangars, machine shop, etc., in Taft, Cal., and establish a flying school at that point, and a plant for the construction of airplanes is also contemplated. Ivan McDougal is in charge of operations.

Personnel

LIEUT. REUBEN H. MOFFATT of the Army Air Corps at Wheeler Field, Honolulu, T. H., has been appointed representative in Hawaii for the Aeronautic Branch to relieve LIEUTENANT ROBERT G BROWN, who has been ordered to Langley Field, Va.

R. S. WAUGH has been appointed manager of the Aeronautical Division of the Gruss Air Spring Company of America at San Francisco.

CHARLES VERMILYA and J. H. DOUGLAS have been appointed pilot-instructors at the Embry-Riddle Flying School, Cincinnati.

ALAN C. DAVIS, for five years connected with the Government engineering work on submarine design and construction, has been appointed to the staff of the Consolidated Instrument Company of America, Inc., New York City, in charge of production.

ART BURNEVIT, formerly of Grand Forks, N. D., is now instructor at the Fargo Aviation School.

CHARLES S. DION, who has been in Newark, N. J., city aeronautical engineer since last spring, has resigned.

COMDR. ARCHIBALD H. DOUGLAS will assume command of the Naval Air Station at Anacostia, D. C., about June 1, succeeding LIEUT. COMDR. DEWITT WATSON, who has been ordered to sea duty.

JACKSON GRIMES, JR., of Denver, Colo., has been appointed representative of the Roller-Smith Co. of New York City in Colorado, Utah, Wyoming and Northern New Mexico.

HARVEY GLASS, MAURICE V. FOLEY, GEORGE C. ROBERTS, and STANFORD B. ROPER, all Parks Air College graduates, have been named instructors on the staff.

MARVIN E. NULSEN, formerly with Holcomb & Holke, Indianapolis, has become associated with the Mahoney-Ryan Aircraft Corp. as assistant to the vice president and general manager.

EDWARD J. MAYER, formerly with the Century Electric Co., St. Louis, has joined the engineering department of the Mahoney-Ryan Aircraft Corp. as a draughtsman.

FRANK A. CORIELL has joined the Gates Aircraft Corp. as chief of production on the Belgian R. S. V. plane to be manufactured by the Gates firm in America. Mr. Coriell has designed and built in the aircraft field since 1913. He has lately been with the Fokker group.

CHARLES FROESCH has been named sales engineer of the Fokker Aircraft Corp. of America, Hasbrouck Heights, N. J., according to an announcement by Anthony H. G. Fokker. Mr. Froesch has been with the corporation as project engineer and assistant to Alfred A. Gassner, chief engineer. He will now establish contacts between sales, engineering, and production departments.

ART KIRK, ELMER LITTLE, RUSSELL TYRELL, F. F. FORMBY, JOE TRACY, PAUL BRIGGS, AUSTIN L. SHREVE, HILDA JARMOUTH and F. W. HAINEY are new employees with the Aero Corporation of Calif.

LIEUT. HERBERT H. MILLS, finance officer and assistant engineering officer of the 43rd Division, Air Service, has been named general manager of Brainard Field, Hartford, Conn.

LINCOLN B. SMITH of Holyoke, Mass., has been appointed a member of the board of managers of Barnes Airport.

MAJ. HENRY ROGERS of Earlington, Ky., has been appointed superintendent of commercial flying at Bowman Field, Louisville's municipal airport.

MAJ. D. A. DAVISON, assistant engineer commissioner of the District of Columbia, has been designated as the District's representative on the Bingham Municipal Airport committee.

J. E. COOK, formerly local manager of the branch office of Aviation Service and Transport Co., maintained at Louisville, Ky., for student enrollments, is now registrar of the National Aviation School, that city.

CHARLES F. VAN SICKLEN, it is now officially announced by the Great Lakes Aircraft Corp., Cleveland, has been elected vice president and director of sales.

THOMAS B. EASTLAND of the firm of Bond & Goodwin & Tucker, Inc., San Francisco, has been elected a director of Airport Development & Construction Co. to succeed Charles A. Glose.

Stearman Increases Production Schedule

WICHITA, KAN.—The Stearman Aircraft Co. is increasing its production maximum to four standard three-place jobs a week, with a Stearman Speed Mail with Cyclone power to be produced for fly-away delivery every two weeks. There will shortly be added to this schedule the Stearman Coach, a four-place cabin plane to be powered with the J-6 engine.

Stearman deliveries the past week included standard three-place jobs to R. T. Miner and Bob King of Los Angeles and to the Mid-Continent Airways of Tulsa, Okla., for delivery at the border. It is thought here the plane will be delivered by the Tulsa company to the Mexican Government. The Interstate Airlines of Evansville, Ill., has accepted delivery on the last of seven three-place jobs ordered.

Two more Cyclone powered mail jobs have been delivered to the Varney Airlines of the Pacific Northwest, making five of an order of six now in service. Walter T. Varney, operator of the lines, is expected here soon to accept delivery on a Cyclone plane for his own use.

Big Order for Consolidated

NEW YORK, N. Y.—From the Travel Air Manufacturing Co. the Consolidated Instrument Co. has now received an order for avigational equipment totalling $119,000, according to J. Leopold, president. The equipment will be installed in 800 Travel Air planes of three different models. It will include the following: bank-and-turn indicators, tachometers, altimeters, air speed indicators, compasses, oil pressure and temperature gauges, and ignition switches. All equipment will be of standard design, including the new standard type of Consolidated instrument board. In addition, all instruments and instrument boards to be used with Travel Air cabin model planes will be supplied with indirect lighting of Consolidated design.

Aeronautical Calendar

April 6-14	Second Annual All-American Aircraft Show of the Detroit Board of Commerce, Convention Hall, Detroit, Mich.
April 9-10	Society of Automotive Engineers, Detroit Aeronautic Meeting, The Book-Cadillac Hotel.
April 10	National Glider Conference, Statler Hotel, Detroit, Mich.
May 1-3	Joint meeting professional divisions, American Society Mechanical Engineers, Detroit, Mich.
May 4	National Elimination Balloon Race for the Litchfield Trophy, Pittsburgh, Pa.
May 7	International Aeronautic Conference and Exhibition, Seville, Spain.
May 14	Fourth Annual Aircraft Engineering Research Conference, Langley Field, Hampton, Va.
May 15-20	First International Congress on Sanitary Aviation, Paris, France.
May 27-30	American Society of Mechanical Engineers, National Aeronautic Meeting, Hotel Jefferson, St. Louis.
May 27-June 2	Indianapolis Aviation Show of the Indianapolis Aircraft Association, State Fair Grounds.
May 28-30	Gardner Annual Trophy Race, St. Louis, Mo.
June 27-30	International Light Plane Meet, Amsterdam, Holland.
July 16-27	International Aircraft Exhibition of the Society of British Aircraft Constructors, Olympia, London.
Aug. 24-Sept. 2	National Air Races and Aeronautical Show, Cleveland, O.
Aug. 26-28	Society of Automotive Engineers, Cleveland Aeronautic Meeting.
Sept. 6-7	Schneider Cup Race, over the Solent, Cowes, England.
Sept. 7-15	International Aircraft Exhibit of 1929, Coliseum, Chicago, Ill.
Sept. 28	Gordon Bennett Balloon Trophy Race, St. Louis, Mo.
Oct. 12-27	Southwestern Aircraft Exposition, State Fair Grounds, Dallas, Tex.
Dec. 1-9	International Aeronautical Exposition of the Aeronautical Chamber of Commerce, Chicago.

Buffalo's Own Products Feature Show

(*Continued from page 965*)

one of these machines, formed the most interesting part of the Curtiss group.

Coupled with them were a Curtiss Robin with a Challenger engine, a Robin with an OX-5, a Cessna with Scarab engine, an uncovered lower wing panel of the Falcon type and the uncovered top wing of the Hawk type. Curtiss Conqueror, Challenger, Chieftain and D-12 engines were shown on separate stands, as well. This display shared with the Ford machine on almost equal terms the interest of the spectators on the opening night.

Next among the local products stood the exhibit of the Consolidated Aircraft Corp. and Fleet Aircraft, Inc., a branch of the former. The Consolidated Husky training type and the Fleet Model 1, formerly known as the Husky Junior, were shown. The Airsport of G. Eilas & Bro., Inc., the Aristocrat of the General Airplanes Co., and an uncovered all-metal machine said by its maker, the Hall Aluminum Airplane Co., to have been in service four years as a Navy shipboard fighter, completed the local airplane contingent. The Irving Parachute Co., another local product of considerable fame, also had an attractive display.

Ford Blocks Traffic

It was necessary to block all traffic along the thoroughfares between the airport and the Armory in order to get the Ford, with wings detached, safely through the streets. On arrival at the Armory the undercarriage was taken off and even then it was necessary to tip the machine at a wide angle in order to get it through the huge door. Assembled in full it became the mecca of more than 8,000 on the first night.

This transfer of the Ford and other planes through the streets from the airport to the show was one of the features of the event. About 30 planes were said to have been flown to the show. Under the direction of Nathaniel E. Duffy, manager of the local airport, the wings of these machines wer speedily loaded on a scenery van and shipped to the Armory while the fuselages were dragged in by trucks. This was done without expense to the exhibitor and was accomplished without any damage to any machine.

Two New Planes Shown

Two machines, the Command-Aire two place training plane and the Ta-Ho-Ma (that is, if this machine arrived early in the week as expected), made their first appearances on the show stand. The Command-Aire is practically a twin to the company's three place job except for the arrangement for two persons only in tandem cockpits and the elimination of the cowling between cockpits and concentration of the instruments in the front cockpit, the instructor's seat.

The student or solo pilot in the rear cockpit has to use the front cockpit instruments and for that reason they are grouped at the sides of the instrument board. This method of layout is practically identical in both the Command-Aire and the Fleet, which also attracted considerable attention on account of this novel arrangement and its general efficient appearance.

The trend toward the strictly sport plane was evident, not only in these aforementioned products, but also in such machines as the Genet engined Fairchild 21 (which was the object of much favorable comment, by the way), two Avians (Cirrus), the Davis monoplane (Scarab), formerly the American Moth; the Airsport (Anzani), the Dunham (Anzani), and the Taylor Chummy (Kinner), the last three being of semi-cabin construction.

Forms 25 Per Cent. of Planes

These are classified as sporting machines inasmuch as they were either designed definitely for the private owner or are incapable of profitable commercial work except in the way of instruction. This type represented 25 per cent. of all the planes and fuselages exhibited.

The more familiar three place commercial machines, which are also used for sport but were not designed particularly for this branch, were represented by Eaglerock (Hispano-Suiza), Eaglerock (OX-5), American Eagle (Warner), American Eagle (Hispano-Suiza), Command-Aire (Scarab), Command-Aire (OX-5), Bird (OX-5), Challenger (OX-5), and two Wacos (OX-5). These represented about 30 per cent. of the machines shown.

There were five of the two or three place cabin type, including: Robin (Challenger), Robin (OX-5), Stinson Jr., (Scarab), Aristocrat (Scarab), and Cessna (Scarab). These were about 14 per cent. The larger single engine cabin machines were represented by the Fairchild 71 (Wasp), Stinson Detroiter (Whirlwind), Bellanca (Whirlwind), and the Lockheed Vega (Wasp).

Only One Flying Boat

The only flying boat was the Savoia-Marchetti (Isotta-Fraschini) of the American Aeronautical Corp. Curtiss, Hall and Consolidated furnished five military samples and Ford, the tri-engined representative. It should be remembered that this compilation includes only those on the floor when the show opened and that the Fokker Friendship was awaiting transportation to the Armory, the Ta-Mo-Ha was to be installed early in the week and two New Standards were expected Monday.

The engine displays played important parts in the eyes of the spectators also. The mechanically-minded had a wide range on which to indulge their interest. Isotta-Fraschini engines of the 80 hp. air cooled, in line; 420 hp. air cooled, two banks; 560 hp. and 1,000 hp., the latter water cooled, were conspicuous. Close by these were the Curtiss Conqueror of 600 hp., D-12 of 435 hp., both water cooled; and the Challenger of 170 hp. and Chieftain of 600, the latter two air cooled, were receiving equal attention.

The Bliss Titan, series 2, of 200 hp. and the Bliss Jupiter of 460 hp.; the Warner Scarab of 110 hp.; the Wright Whirlwind of 220 hp. and the Kinner 100 hp., likewise had attractive exhibits.

New Firms Announced

NEW HAMPSHIRE AVIATION & MARINE Co., capital $50,000, officers: Fred A. Putnam, Robert S. Fogg, Horton L. Chandler, Concord, N. H. This firm, it is stated, will operate aircraft from the bases at the Weirs and Wolfeboro on Lake Winnipesaukee and at the bridge on the Daniel Webster Highway over Lake Winnisquam. Concord Airport is to be the principal base. Plans of the firm also include establishment of a flying school. The announcement asserts that the company has been designated an authorized Wright engine service and parts station.

CITIZENS AIRCRAFT CORP., New York City; Jessie W. Byrnes, Garrick M. Spencer, and Franklin Lockwood, the latter at 1140 Fifth Avenue, New York, are directors and subscribers; to deal in aircraft.

ST. LAWRENCE VALLEY AIRWAYS, INC.; Ray G. Kentner, Ivan C. Putney, Cecil Clement, formerly of the Rochester Flying Service; to own and operate a flying field 12 mi. east of Ogdensburg, N. Y., in the town of Lisbon directly opposite Iroquois, Ontario; to purchase Waco.

NIAGARA FLYING SERVICE, INC.; 100 shares no par value stock; Roland L. O'Brien, Walter F. Stafford, and Henry S. Jones; Buffalo, N. Y. Slee O'Brina, Hellings and Ulsh, Buffalo, attorneys.

NEW YORK AVIATION CORP.; 500 shares no par value stock; Dorman T. Connet, Clarence E. Bahn, Howard F. Mulholland, 120 Broadway, New York City.

AIR TOURS, INC.; capital $50,000; Joe Livermore, H. B. Cristler, C. E. Howell, and others; Seattle, Wash.

Distributors Named

NEW STANDARD—Clifford Ball, Pittsburgh-Cleveland air mail run operator; Western Pennsylvania and Eastern Ohio territory; four planes ordered, eight more under contract.

COMMAND-AIRE—Texas Flying Service, Fort Worth Tex.; Texas territory; two planes of this type now operated.

KEYSTONE-LOENING — Thompson Aeronautical Corp.; Ohio and Michigan territory; three Keystone-Loening amphibian Air Yachts contracted for Detroit-Cleveland passenger service to open this Spring.

SWALLOW—Jim Granger, former Southern California distributors; entire Pacific Coast territory.

DH MOTH — Thompson Aeronautical Corp.; Michigan and Ohio territory.

EAGLEROCK—T. F. Williams, Woodstock, Ontario, Canada; Ontario franchise; owns OX Eaglerock and has ordered Hisso Eaglerock for demonstration work.

EAGLEROCK — Anderson Brothers Air Service, Calgary; Province of Alberta territory; Eaglerock demonstrator ordered.

MONO AIRCRAFT—Frank R. King and G. H. Byrne, Big Spring, Tex.; West Texas territory.

AMERICAN EAGLE—Eagle Airways, Inc., Greenville, S. C., given dealer territory. OX American Eagle biplane purchased.

CESSNA—Atlantic Air Servoice, Westfield, N. J., re-appointed distributor in New Jersey and Metropolitan New York, also handles Curstiss products.

TACOMA PUBLIC LIBRARY

AIRPORTS AND AIRLINES

Begin Additional Airport Projects

Development Work Being Done in All Parts of the Country

Construction totalling $100,000 and including an administration building, tool house, restaurant, hangar, lighting improvements, and extension of the field are reported now underway at the Menefee Airport, New Orleans, La. Contracts have been let for the construction of hangars and added administration building at the Camden, N. J., airport being promoted by the Central Airports, Inc., to serve both Camden and Philadelphia.

A new hangar costing $50,000 is to be built at Corry Field, Pensacola, Fla., to accommodate both land and water planes. A balloon observation station will be established at the Evansville, Ind., Municipal Airport about July 1 by the Government Weather Bureau under the supervision of McLin Callum. The Little-Greiner Flying Service, Inc.., of Springfield, O., is building an 80 by 60 ft. hangar. Construction will start soon on the 150 by 150 ft. hangar at the Montgomery, Ala., Municipal Airport. The building will include workship, waiting room, offices and school quarters.

Start T. A. T. Hangar

A new hangar for T. A. T., 130 by 240 ft., and a garage 100 by 110 ft. are under construction at the Grand Central Air Terminal, Glendale, Calif. A new hangar and an administration building has been completed at the Aero Corporation of California Field, at Los Angeles. Roofs of the 27 airport buildings have been painted with alternate black and orange in order to make the field more easily distinguishable in the air. A steel frame hangar is being built at the Los Angeles Metropolitan Airport for L. H. Hayes. The Frahm Oldsmobile Co. of Los Angeles is developing a 40 acre airport at Anaheim, Calif.

Financing of the project to acquire Roosevelt and Curtis Fields on Long Island has been launched in New York with a public offering of 300,000 shares of capital stock. About $24,000 will be spent in improvements to the flying field at Teterboro Airport according to the Atlantic Aircraft Corp. The work will include resurfacing of certain areas and installation of better drainage.

Work on the air-rail passenger station at the Columbus, O., Municipal Airport has been started by the Pennsylvania and Baltimore & Ohio Railroads. The station will be 600 ft. long between the railroad tracks and the southern end of the field. Construction of concrete runways and hangars has been started. Part of the drainage system has been installed. W-I-L Air School, Inc., St. Louis, is building a school and administration building at its own airport and plans to erect a 12 plane hangar as soon as weather permits. This hangar will include a service and repair department.

Rickenbacker Airport of Sioux City, Ia., is being equipped with a 20 plane hangar, 140 ft. wide and 100 ft. deep to cost about $20,000. The building will be 12 ft. high at the side and 35 ft. high at the center and will include offices, sleeping quarters for the staff, a school room and a shop. It will be ready in April. Efforts of the Junior Chamber of Commerce at Birmingham, Ala., to establish a municipal airport there are receiving the endorsement of various civic organizations.

Will Vote on Bond Issue

Tampa, Fla., alderman will be asked in June to provide funds for another hangar and administration building, and new quarters for the McMullen Aviation School at the Tampa Airport. Citizens of Ardmore, Okla., will vote on a bond issue in April which is proposed to provide a new Municipal Airport. The issue of $25,000 of airport bonds has been voted in a recent Yuma, Ariz., County election. This sum is expected to make Fly Field a first-class airport.

Erection of a meteorological and radio station is nearing completion. Servicing of the field and installation of proper lighting equipment will be pushed. A hangar is being built at the Mangum, Okla., Municipal Airport which is to be called Ponder Field when completed in honor of Captain W. P. Ponder of Fort Worth, Texas. Construction will start soon on a 120 by 180 ft., airplane factory at Mines Field, Calif., for the Moreland Aircraft Co.

Omaha Plans Improvements

Contract has been let for the construction of a $9,000 hangar, 100 by 125 ft. at the Greenville, S. C., Airport. Purchase of an additional tract of land and construction details are under consideration. The Omaha, Neb., Municipal Airport Commission has recommended to the City Council that the present field be retained and developed following the favorable inspection report of the field recently made by an airport representative of the Aeronautics Branch. The Commission recommended that the Austin Company be retained to survey the field and draw up a comprehensive plan for improvement.

The Lockwood Greene Co. has been named by the American Aeronautical Corp. to develop its flying base and manufacturing plant near Port Washington, L. I. The main building will be 580 ft. long and 150 ft. wide with a 100 ft. clear span area on the ground floor. The second floor will be 50 ft. wide and 580 ft. long. The two wings will be 230 ft. long and 130 ft. wide, and will be used for handling and storing completed planes. Concrete runways will be built to the bay from these wings. Work will be rushed as much as possible but in the meantime production will proceed in a temporary building at Flushing, L. I.

Graders and levelers are being used on a 300 acre Salt Lake City, Utah, airport to improve the condition of the field. Construction of hangars at Ten Mile Airport, Charleston, S. C., is expected to start April 1 following the signing of a lease between the city and the Crescent Air Service of Philadelphia, which will operate the field. The Robertson Aircraft Co. of St. Louis has been granted authority by the Municipal Airport Commission to reconstruct and use the old hangar at the city owned flying field at Bridgeton. The company will probably spend about $25,000 on the hangar. A strong movement is on foot for the development of an airport at Gaspee Plateau near Providence, R. I.

Twenty-nine more municipal airports planned by cities throughout the United States, according to the Aeronautics Branch, are: Winfield, Ala.; Jerome, Ariz.; Cheshire, Conn.; Joliet, Ill.; Wheaton, Ill.; Elkhart, Ind.; Council Bluffs, Ia.; Topeka, Kan.; Greenfield, Mass.; North Adams, Mass.; Croockston, Minn.; Minneapolis, Minn.; Scottsbluff, Neb.; Deerfield, Neb.; Avalon, N. J.; Paterson, N. J.; Jamaica Bay, N. Y.; Plattsburgh, N. Y.; Rosedale, N. Y.; Williamson, N. Y.; Cleveland, Okla.; Milford, Pa.; Reading, Pa.; Wilkes-Barre, Pa.; Charleston, S. C.; Clarkesville, Tenn.; Port Arthur, Tex.; Oak Harbor, Wash.; White Bluff, Wash.

Install Lighting In Two Hours

KANSAS CITY, MO.—Fairfax Airport here was transformed into a suitably equipped night flying field within two hours recently when N.A.T. officials declared the Municipal Airport too wet for the planes to land on and the city was faced with the prospect of being temporarily without direct air mail service. Fairfield Airport was available but had no night lighting equipment. About 3.30 P.M. the work started. A crew of 80 light and power company men laid an emergency power line a mile long, a B.B.T. 180 deg. flood light was installed on top of the largest hangar, the hangars and wind cone were flood lighted, 47 kerosene torch pots outline the field and three green lights were provided to give landing direction. The mail pilots used the field and considered the lighting entirely satisfactory.

Colonial Builds Big Terminal at Boston

BOSTON, MASS.—One of the largest hangar and passenger buildings in this country is under construction at the local airport at East Boston. The structure is being erected by the Colonial Air Transport, operator of Contract Air Mail Route 1, at a cost of $125,000 and will accommodate 300 passengers and visitors. It will be of Roman stucco with steel reinforcement. It is expected to be ready for service by the middle of June.

The building will have a frontage of 200 ft. and a depth of 147 ft., with an area of about 14,000 sq. ft. The hangar section will accommodate 25 passenger and mail planes, it is said, while the passenger section will include a rotunda having ticket offices, baggage check room, rest room and a lounge above the rotunda fitted in club style.

Access to the terminal for both passengers and cargoes will be through a tunnel from the street side of the building. Covered passages will lead from the rotunda to the planes. There will be stock, workshop and express rooms, also, on the street side of the first floor. On the second floor will be sleeping accommodations for six pilots. Offices of the officials will be above the rotunda on the field side.

Ask Bids on Air Mail Line Serving Victoria

WASHINGTON, D. C.—Bids will be received up to noon April 29 for transportation of air mail between Seattle, Wash., and Victoria, Canada, the Post Office Department recently announced. The service proposed will start July 1, will be for not more than 12 round trips a month and will be operated in close connection with the arrival and departure of mail steamers.

At least 75 per cent. of the capital in the successful organization must be subscribed by American citizens and the aircraft used must be built in this country. The proposed contract will operate for a term of 10 yr. The route is about 76 mi. one way.

To Test New Asphalt Runways

KANSAS CITY, KAN.—A new type of asphalt which can be laid directly on the dirt, the only preparation necessary being harrowing of the ground, is to be tested on two runways at the Municipal Airport and Frairfax Airport by airport officials and representatives of the Standard Oil Co., which developed the preparation. The preparation mixes with the soil and hardens and costs only about one-third as much as ordinary asphalt, it is said.

J.A.C. Airport Made Flag Stop

MARION, IND.—The J. A. C. Airport here has been made a flag stop on the route between Indianapolis and Detroit, operated by the Capitol City Airways, Inc., of Indianapolis.

Announce Mail Rate Change

WASHINGTON, D. C.—The Post Office Department has just issued the following statement relative to rates on international air mail routes from Miami, Fla.: Effective at once, the rates (postage plus air-mail fee) for the dispatch by air of articles for delivery in the countries served by routes F. A. M. Nos. 4, 5, 6, and 7, from Miami to foreign countries will be as follows: Five cents each half-ounce or fraction to Cuba and Bahamas: $.10 each half-ounce or fraction to Haiti and Dominican Republic: $.25 each half-ounce or fraction to countries beyond the Canal Zone.

Sky Harbor Aviation Country Club Begun

CHICAGO, ILL.—The landing field and the first of a series of hangars each to be 100 by 120 ft. has been started at Sky Harbor, a $350,000 aviation country club project of the United Aviation Corp. of Chicago. The tract includes 135 acres and will be the home port of the Gray Goose Air Lines, Inc., and Interstate Air Lines, Inc., subsidiaries of the United Aviation Corp.

The Sky Harbor Club will be a three story and basement structure having instruction rooms of the Sky Harbor Institute, waiting rooms, club rooms, a library, card and social room. There will be a terrace and roof garden for teas and luncheons and observation galleries. There will be four runways, each 500 ft. wide and about one-half mile long.

Sky Harbor will offer every country club service and convenience to its members and guests. The club will be the summer home of the Petrushka Russian Club of Chicago. The University Golf Club adjoining the airport will be available.

New Pickwick Service May 1

FORT WORTH, TEX.—The first leg of the Pickwick Airways Corp. service is expected to be in operation between Los Angeles and El Paso, Tex., by May 1 under present plans. Extension to this city is expected by July and eventually the route will go to Chicago. Pickwick also will bid on the air mail route connecting Los Angeles, El Paso and this city when the Post Office Department authorizes bids on the proposed lines.

Universal Gets Braniff Line

ST. LOUIS, MO.—Universal Aviation Corp. has taken over Paul R. Braniff, Inc., operating air lines in the Southwest with headquarters at Tulsa and Oklahoma City, Okla., it was announced recently. Universal officials state that the organization will be known as the Braniff Air Lines and will be operated as a division of the Universal company.

Greer Reports Many Students

CHICAGO, ILL.—Greer Airways, a subsidiary of Greer College, announces that 261 new students have been enrolled in the aviation course since January 1.

Consider Draft Of Underwriters

Representatives of Industry Meet With Fire Board

WASHINGTON, D. C.—About 75 representatives of aircraft manufacturers and air transport operators attended a conference March 22 called by the Aeronautics Branch to consider the third draft of regulations for the construction and protection of airports proposed by the National Board of Fire Underwriters. Discussions and arguments grew so spirited at one juncture that J. Brooks Parker, representing Pan American Airways, Western Air Express, Fokker Aircraft Corp. and Keystone Aircraft Corp., left the conference in anger.

He was aroused by the statement by M. E. Newell, representing the underwriter board, to the effect that protested restrictive regulations proposed in the draft would not be changed materially. The regulation against which greatest protest was raised was that requiring all hangars exceeding 10,000 sq. ft. of floor space to be installed with automatic sprinkler systems.

Doubt Sprinkler Value

Objections were raised to the sprinklers on the grounds that their efficiency has not been proved. It was pointed out by government officials that the Army and Navy air corps had not yet regarded it as necessary to install sprinklers in their hangars. Mr. Newell insisted that a study of the risks in bus and truck garages has convinced the underwriters that the sprinklers are necessary.

There was some protest also against a regulation which it was believed would prohibit handling large planes in hangars by tractors, and the operators objected to a requirements that repair, paint and woodworking shops be separated from storage hangars by fireproof walls. Those who spoke against the sprinkler regulation included "Casey" Jones, president of the Curtiss Flying Service; W. Lawrence Le Page, vice president of Pitcairn Aviation; J. P. Murray, of the Boeing companies; Nolan B. Mitchell, Bureau of Standards; W. S. Green, Central Airport, Camden, N. J.; M. W. Parker, Newark Airport, and Burdette Wright, Curtiss Aeroplane & Motor Co.

Copies of the third draft of the proposed regulations may be secured by addressing the National Board of Fire Underwriters, 85 John Street, New York City.

New York to Seek More Sites

NEW YORK, N. Y.—City authorities have taken steps to investigate promising sites for additional city airports to serve this area, sites in the Bronx and the Queens districts being preferred. This action followed a report that work on the Floyd Bennett Municipal Airport on Barren Island has progressed satisfactorily.

N.A.T. Installs Radio Equipment on Planes

CHICAGO, ILL.—Following about a year and a half of practical experiment with radio beacon and ground to plane radio communication, in cooperation with the government, the planes of the National Air Transport and, it is understood, the machines of other large transport companies where the equipment is available, will be fitted out to operate by the radio devices. N.A.T. planes on the New York-Cleveland division, where the tests were conducted, are so equipped already and other machines of the company are being fitted out as rapidly as possible.

Weather reports are transmitted to the pilot through the ground to plane voice apparatus. Attention of the pilot to the voice communication is called by interrupting the beacon. The pilot may then tune in on the higher wave length to receive the information. Hourly reports are given except in case of a sudden weather change when a special broadcast is sent.

A remote tuning control located in the cockpit permits easy adjustment of the receiving set, which is placed in a small compartment at the rear of the pilot's seat. A volume control on the instrument board, earphones, batteries, a vertical mast antenna attached to the fuselage about midway to the tail surfaces, complete the equipment. Two-way voice or code transmission will be available eventually. Installation of similar radio aids are being planned for all the main airways.

Choose Kentucky Beacon Sites

LOUISVILLE, KY.—Selections of locations for three lights on a proposed airway has just been completed in Muhlenberg County, Ky., and a site for an airport near Central City has been approved. Lights will be placed at Bremen and Rosewood. There will be a 2,000,000 c.p. light on a 50 ft. tower at the airport, near Central City. Official information from the United States Department of Commerce is expected within a few weeks. An effort is being made in the county to stress the advisability of the proposed airway between Louisville and Memphis. A movement is on foot to have the new service pass over Central City.

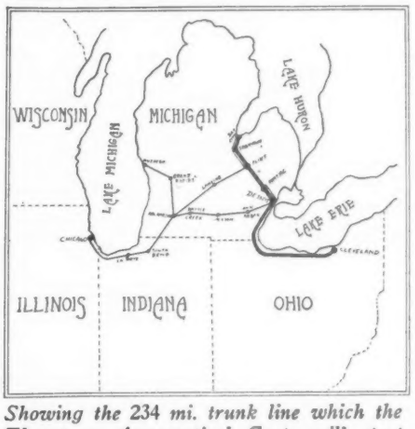
Seeks Uniform Air Laws

WASHINGTON, D. C.—Simplification of the regulations governing the conduct of air men is sought in Aeronautics Bulletin No. 18 of the Aeronautics Branch, which suggests several samples of suitable state, municipal, county and airport aeronautical laws. To achieve the desired uniformity in such matters, the proposed laws in general conform with the requirements of the Federal air traffic rules.

Plans Service to Lake George

ALBANY, N. Y.—Plans for the operation of passenger service between Albany and Lake George and Saratoga have been announced by George E. Walker, president of the Albany Air Service. Ryan Broughams will be used.

New T. A. C. Line



Showing the 234 mi. trunk line which the Thompson Aeronautical Corp. will start operating between Bay City, Mich., and Cleveland April 1. A package express service is also planned.

Two New Air Services Proposed in Mid-West

OMAHA, NEB.—Preparations are being made to start air mail service between this city and Kansas City soon after May 1, following the completion of the lighting of the airway by the Aeronautics Branch. This will be operated by the Robertson Aircraft Corp., Division of Universal Aviation Corp.

Universal officials have announced recently plans for operating a fleet of tri-engine air liners between this city, St. Louis, and Kansas City as soon as the lighting of the mail route is completed.

Proposes Barges for Port

CHICAGO, ILL.—An airport constructed of floating steel barges drawn together by superstructure and tied with planks has been proposed to provide a temporary lakefront landing field. Its sponsors say that the barges could be towed to a permanent site later and, when filled around with sand, could be used as the basis for the runways of a permanent field. It would take six months to build and would cost about $1,000,000.

T. A. T. to Start in July

WASHINGTON, D. C.—The latest announcement relative to the probable beginning of operation of the Transcontinental Air Transport Corp. says that service is expected to start early in July. This will be proceeded by two weeks trial operation of the route for training the personnel. This training probably will start sometime in June.

Oakland Radio Masts Installed

OAKLAND, CALIF.—Two 125 ft. towers near the local municipal airport have been completed by the Aeronautics Branch and it is expected that all of the equipment of the radio station will be installed within the next few months.

Kansas City Municipal Port Station Proposed

KANSAS CITY, KAN.—A new passenger station costing about $35,000 is to be built at the Kansas City airport, it was recently announced. The station will be 85 by 43 ft. and will be two stories high, the second story being smaller in area than the first. A glass inclosed observation tower will extend from the roof of the first floor to above the roof of the second story. The building will be paid for out of airport bond money.

The structure will be of brick with chrome terra cotta finish. The first floor will consist of waiting rooms, dining room, ticket office, cloak and baggage rooms, telegraph office and other accommodations. On the second flooor will be the manager's quarters and rooms for pilots. The roof of the first floor not occupied by the projecting second story will be used as an observation point for spectators. There will be two entrances, one facing the airport and the other facing the public highway.

It is understood that bids will be asked within a few days. Plans for the building were given out by H. F. McElroy, city manager, and Matthew S. Murray, director of public works. It is expected that the building will be completed by late summer.

W. A. E. Pilots Lose No Mail

SAN FRANCISCO, CALIF.—Pilots of Western Air Express have flown over the bleakest and most barren region of continental United States every day for the past three years without losing a single piece of mail entrusted to their care. The region is the Mojave Desert of California and Nevada. Service over the route was started three years ago with a fleet of five biplanes. Today the air equipment includes nine tri-engined Fokkers, with six more being built, and 16 biplanes.

Texas Concern Adds Line

FORT WORTH, TEX.—Daily air passenger service between Fort Worth, Dallas and El Paso was inaugurated March 16 by Texas Air Transport, Inc. This is the company's second line. Intermediate stops are made at Cisco, Abilene, Big Springs and Midland. Fokker Super-Universal six place cabin monoplanes powered with Wasps are used.

Columbus Leases Port Space

COLUMBUS, O.—Two ordinances authorizing leases drawn which will permit the U. S. Air Lines, Inc., of Cleveland, and the Curtiss Flying Service of Ohio, Inc., to occupy plots and operate at the municipal airport here, has been passed by the City Council.

Post of Assistant Created

LOS ANGELES, CALIF.—On recommendation of the Finance Committee, the Los Angeles City Council has created the post of assistant director of airports at a salary of $300 a month.

FOREIGN ACTIVITIES

Toronto Group Plans To Build Big Airport

TORONTO, CANADA—A modern airport about one-half square mile in area is promised this city by the organization of the Canadian Air Express, Litd., a $1,250,000 organization promoting the project. Work on runways 3,500 ft. long, hangars and other buildings will be started at once, the work to cost about $500,000.

The tract is less than 10 mi. from the center of the city. It is expected that the Toronto Flying Club, the National Air Transport and Canadian Airways will occupy hangars, while Canadian Colonial Airways is understood to have leased space for 21 yr. The latter concern is expected to open a service between Buffalo and New York in the summer. The field will eventually be equipped for all branches of aviation and it is expected that the airport will be one of the most complete in Canada.

Foreign News Briefs

A National Air Council has been established in Portugal to have charge of all matters effecting national aeronautics.

The air parcel post fees in Colombia, have been reduced from $3 per 2 1/5 lb., to $1 per lb., and the weight limit on parcels has been increased from 20 to 22 lb.

To speed up transatlantic air mail between America and Germany an air mail service between Berlin and Cherbourg, France, will be opened this summer to connect with the North German Lloyd liners to operate on the proposed New York-Cherbourg-Southampton-Bremen run.

D. H. Dickins of the Western Canada Airways, has been awarded the McKee Trophy for meritorious service in the advancement of aviation in Canada in 1928. Dickins flew 1,035 hr. during the year.

A. V. Roe, pioneer English pilot, constructor and designer, recently was knighted in recognition of his part in English and world aeronautics.

The annual exercises of the air defense of Great Britain, which last year were held over London and aroused considerable comment, this year probably will take the form of an expedition to Scottish territory.

Construction of the St. Hubert airport near Montreal is progressing rapidly. A circular landing area half a mile in diameter has been drained and graded and will be turfed this spring. It is expected that it will be ready for use in the fall. Permanent hard surfaced runways are being installed. Meteorological and wireless stations have been completed and it is expected that the mooring mast will be finished by May 1.

New Zealand is experiencing an aviation boom as a result of the interest created by the flight of the Southern Cross from Sydney, Australia, to Christchurch, the first airplane flight across the Tasman Sea. Flying clubs have been formed and the government is active in encouraging airports and national air defense.

The Yarrow Aircraft Corp., Ltd., of Victoria, Canada, has been formed to acquire control of Dominion Airways, Ltd., of Vancouver, it is announced. Activities for this year will be confined to patrols, field flights, sightseeing tours, photographic surveys and inspections. Vancouver will be the headquarters.

The Bremen, first plane to make an East-West trans-Atlantic flight, is being packed at the Junkers plant in Germany for shipment to the Museum of the City of New York, where it will be housed as a permanent exhibit.

All space has been reserved for the International Air Exhibition at Olympia, London, July 16 to 27. American, French, German and Italian constructors will be represented. Three governments will display national exhibits.

British Designer in America

LONDON, ENGLAND—Oswald Short, noted designer of metal aircraft, has arrived in the United States to study American aeronautical developments. He plans to make an informal survey of many airports and manufacturing plants. His concern built the flying boat used by Sir Alan Cobham on the flight around Africa and the machines to be used on the Mediterranean section of the England-India service. The company has been the leading exponent of metal construction for aircraft in this country.

British Designer to America

GUAYAQUIL, ECUADOR—Rafael A. Dillon's application for the Vickers Air Lines in this country under a five year monopoly contract has been refused by the government. Mr. Dillon proposed to operate planes between this city and Panama and Quito. Americans displayed considerable interest in the project inasmuch as the granting of a monopoly contract would have interfered seriously with the Canal Zone-Chile air mail line now being developed by Pan American Airways.

English Air Fund Decreased

LONDON, ENGLAND—The total air estimates for this year as prepared by the Air Ministry show a net decrease of $250,000. Civil aviation will get $2,250,000 as compared with $2,075,000 a year ago.

"Tramp" Air Freight Plane Charter Signed

LONDON, ENGLAND.—"Tramp" freight planes may operate now in similar fashion to "tramp" ocean steamers. This was brought about by the filing of the first charter party for commercial aircraft recently, in connection with transportation between Great Britain and Germany. Some of the terms of the charter are as following: Demurrage is at the rate of $175 per night. The airplane is to load in one running day and is to be discharged on the day of arrival. Free discharge is to be carried out by the consignees at the average rate of two tons per hour.

The carriage of the cargo is at the risk of the charterer, and the owners accept no responsibility for loss, damage, or delay. The charterers are offered facilities to insure against transport risks, including loading and unloading. It has been accepted by the principal aircraft owners in Great Britain and approval of all the Continental owners is to be sought as well.

London-India Service To Be Started Today

LONDON, ENGLAND—Unless unforeseen obstacles arise Imperial Airways will launch today, March 30, the long planned for Empire airway connecting this country with India. The inaugural plane is due to take off from Croyden at 6:45 A.M. today. The machine is due to arrive at Karachi, India, at 4 P.M. Friday, April 5. An outline of the service was given in the February 9 issue of AVIATION.

This is considered one of the greatest forward steps ever taken by British commercial aviation. Aeronautical leaders of the country have dreamed of linking the far-flung units of the Empire by air. A second Empire airway is being developed from this city to Capetown, South Africa.

International Congress Meets

BRUSSELS, BELGIUM—Delegates from 26 nations, not including the United States, attended the recent session of an International Civil Aviation Commission Congress here to study problems connected with medical examination of pilots, installation of wireless on airplanes, the standardization of construction materials, and cartography and meteorology and their relation to aviation.

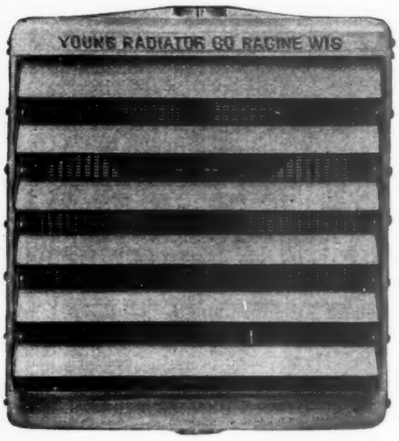
Toronto Flying Club Busy

TORONTO, CANADA—Skis were used by the local flying club through the winter and the weather did not seriously cut down the average weekly flying time.

BUYER'S LOG BOOK

Young Radiators

A NEW type of unit heater with all copper condenser core is now offered by the Young Radiator Co., Racine, Wis. This heater is particularly adaptable to use in airplane hangars, factories ,plants and warehouses. Five models of various capacities and ranging in weight from 65 to 125 lb. are included in the line. These units are also used for drying and cooling.



One of the models manufactured by the Young Radiator Co., Racine, Wis.

Among the features embodied in this type are the adjustable deflectors which direct the air passing through the condenser in any desired direction and, when deflected downward, drive the heat to the floor where it is wanted. The condensers consist of flattened vertical copper tubes which diffuse the greatest amount of heat quickly, yet which are not too flat to allow full circulation and eliminate clogging. Rows of flat copper fins tapered slightly downward, are sweated and fused to the tubes assuring permanent all metal contact and most efficient conductivity of heat and holding the tubes firmly in place.

To insure against leakage resulting from excessive steam pressures, the condenser tubes are brazed to the header plates. The entire unit will withstand a steam pressure of 125 lb. per sq. in. Allowance is made for expansion and contraction due to temperature and the condenser unit will not burst from freezing.

These unit heaters can be used with hot water as well as steam installations, the only difference being a reduced capacity in the case of hot water. Motor and fan develop a high air delivery at a very small operating cost and the largest unit is equipped with a one-sixth horsepower motor. Three speed motors also can be furnished and thermostatic control for automatic stopping and starting can be installed.

Spaulding "Non-Sink" Coat

THE "NON-SINK" Coat, manufactured by A. G. Spaulding & Bro., was originated especially for aviators whose duties take them over the water. The coat is guaranteed to keep a man afloat 60 hr.

The outer shell and lining are of waterproofed gabardine. The inner lining is of quilted Ilanasilk or Kapok. Attached are two belts: one passes around the waist giving a snug fit, the other extends from the middle of the back, between the legs and is fasteneed to the inside front of coat, making it impossible for the garment to work up around the body when the wearer is in the water. The non-sinkable coat is warm and comfortable. The company also manufactures a Navy Non-Sink Coat.

SIDE SLIPS

By ROBERT R. OSBORN

We can't say whether the writer of a recent news item in a New York paper had a grudge to settle with one of our airplane manufacturers or not, but our quotation from the item shows that it makes a lot of difference just how a thing is said.

"Colonel Lindbergh arrived in Los Angeles today after a short flight from Glendale," the quotation says. "After a hasty inspection of the new ———— airplane he hurriedly left the field in an automobile."

* * *

"Major Segrave was traveling so fast that photographers stationed on the beach found it almost impossible to follow him with their eyes. To the spectators in the grandstand high on the sand dunes, however, the visibility was much clearer and his run could be witnessed clearly."

A. B. P. of Harrisburg, Pa., sends in the above item with the comment: "You claim to have speared this hokum and nailed the hide to your cabin door. How about the enclosed that I clipped from the March 11 issue of the Harrisburg *Telegraph*? They're not all speared yet. Not being at all satisfied with finding that it was almost impossible to see the object (was it a car?) at the lower altitudes some of the more crafty spectators proceeded to pull back on the stick and take advantage of the more rarefied air of the sand dunes and grandstands. It must have been wonderful up there. What a whale of a difference a few feet can make."

What A. B. P. says is true. In spite of our offers to provide a first class head-turner and glimpser, one with lots of air race head-turning and glimpsing experience with machines traveling at much higher speeds, the newspapers still sent correspondents suffering with eye trouble down to Florida.

* * *

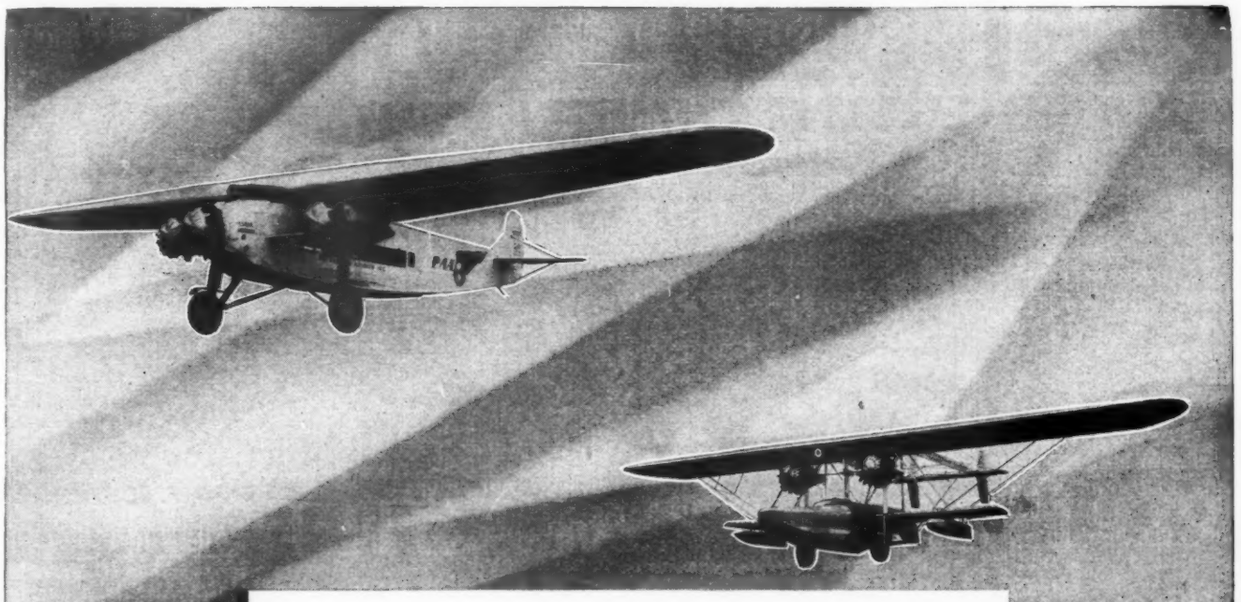
George Weis, the present holder of the speed record for an airplane carrying an electric stove from coast to coast, sends in a good one from a Department of Commerce mechanic's license examination at Curtiss Field. The question was, "What emergency equipment should be carried in an airplane?" The answer given was, "Red Cross kit, axe, saw cutters and fire water outfit."

Possibly this is the correct answer, but our thoughts in the matter are that if the fire water outfit is available to the average pilot, the axe, saw and cutters might better be left out.

* * *

A. B. M. complains as follows: "I might have survived the kidding of my friends, but to be razzed in Side Slips is the end of everything for me. Let me advise you that I am not carrying a sea water condenser in my plane, as announced by a triple-ply boob at the factory's publicity office. What I am taking is a breath-condenser. This, as you doubtless know, is a Scotch invention to condense the fumes of the breath."

A. B. M.'s explanation is accepted and he is restored to full standing in the society. If our kidding has bothered him enough so that it is the end of everything for him, he is the first one to be so affected. Almost everyone who calls at the office to complain forcefully about our comments seems to be in a very healthy condition.



THE NEW PAN-AMERICAN COMMERCE

Into a land where transportation has been typified by the ox-cart, Pan-American Airways has brought the spirit of aviation.

The pioneer flight of Colonel Charles A. Lindbergh to Panama in a "Wasp" powered Sikorsky Amphibian, has opened up the wonderland of the West Indies and Central America. Travellers from the North, pleasure bent, or in the interests of commerce, now have available swift and comfortable transportation to this land rich in natural resources and historical interest.

As the West Indian traveller boards the giant Fokker or Sikorsky plane at Miami, he is sure that he is flying with the best possible equipment. The combination of multi-engine security with Pratt and Whitney dependability insures arrival at the destination in schedule time.

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD CONNECTICUT

PRATT & WHITNEY, U.S.A.
DEPENDABLE ENGINES

Wasp & Hornet
ENGINES

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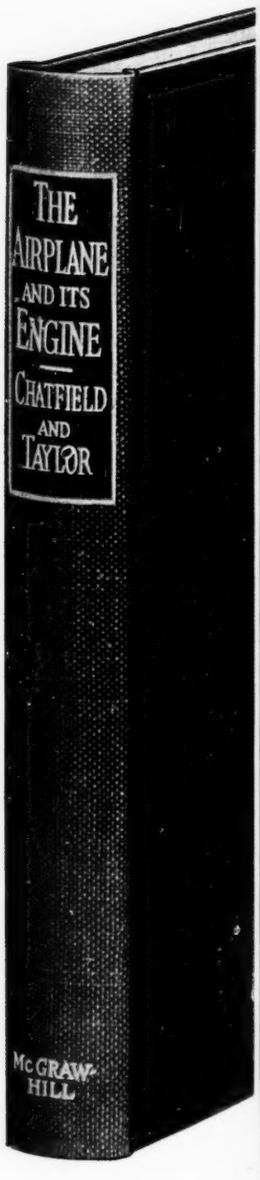

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By C. H. CHATFIELD and C. F. TAYLOR

Associate Professors in the Course in Aeronautical Engineering at the Massachusetts Institute of Technology

329 pages, 5½x8, 200 illustrations. $2.50 postpaid

A sound, clear and simple discussion of the fundamental principles, construction and capabilities of the airplane and its engine. Written for all interested in the function of airplanes in modern life, the book strikes a mean between the technical and popular exposition, founding all explanations only on the basic principles of physics involved.

Little mathematics has been used and a knowledge of only elementary physics is required.

Aircraft Handbook

By FRED H. COLVIN, Editor, American Machinist, and HENRY F. COLVIN

464 pages, 5x8, flexible, 154 illustrations. $4.00 postpaid

Complete information on the operation and maintenance of standard aircraft engines, prepared in cooperation with the manufacturers of these engines. The newest developments in aircraft instruments are given the fullest discussion. The Earth Inductor Compass, for instance, is treated thoroughly.

The Official Air Regulations of the Department of Commerce have been included, as well as adequate information for those contemplating the construction of airports.

Airplane Design-Aerodynamics

By EDWARD P. WARNER

Professor of Aeronautical Engineering, Massachusetts Institute of Technology; Appointed Assistant Secretary of the Navy for Aeronautics, July, 1926.

600 pages, 6x9, 333 illustrations. $7.50 postpaid

The first volume of a series on airplane design. The book presents a thorough, authoritative treatment of aerodynamics; a synthesis and interpretation of the prior art and the existing state of knowledge in the fundamental principles of airplane design.

The discussion is detailed and complete, covering in logical sequence every phase from nomenclature to controls and controllability; maneuverability, and spinning.

Civil Aviation

A REPORT

By the Joint Committee on Civil Aviation of the U. S. Department of Commerce and the U. S. American Engineering Council

Foreword by HERBERT HOOVER

189 Pages, 6x9. 31 maps and diagrams. $2.50 postpaid.

Here is definitely constructive study providing a comprehensive and reliable review of the accomplishments and problems of civil aviation throughout the world. The book presents a survey of the economic possibilities of civil aviation in this country with a view of supplying information for legislation in this field and for analysis of operation and for guidance in sound investment.

Airplane Design and Construction

By OTTORINO POMILIO

Consulting Aeronautical Engineer, the Pomilio Brothers Corporation

403 pages, 6x9, illustrated. $5.00 postpaid

Of the many distinctive achievements in aeronautics, few stand out so conspicuously as those of the Pomilios of Italy. In 1918, by the special request of the United States Government, they came to this country to assist in an aircraft production program. Important data from their files on the design and construction of airplanes are given in this book.

The Airplane Engine

By LIONEL S. MARKS

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454 pages, 6x9, 349 illustrations. $6.00 postpaid.

The book formulates existing knowledge of the functioning of the airplane engine and its auxiliaries and discusses the essential constructive details of those engines whose excellence has resulted in their survival. The detailed working drawings and diagrams are of especial value.

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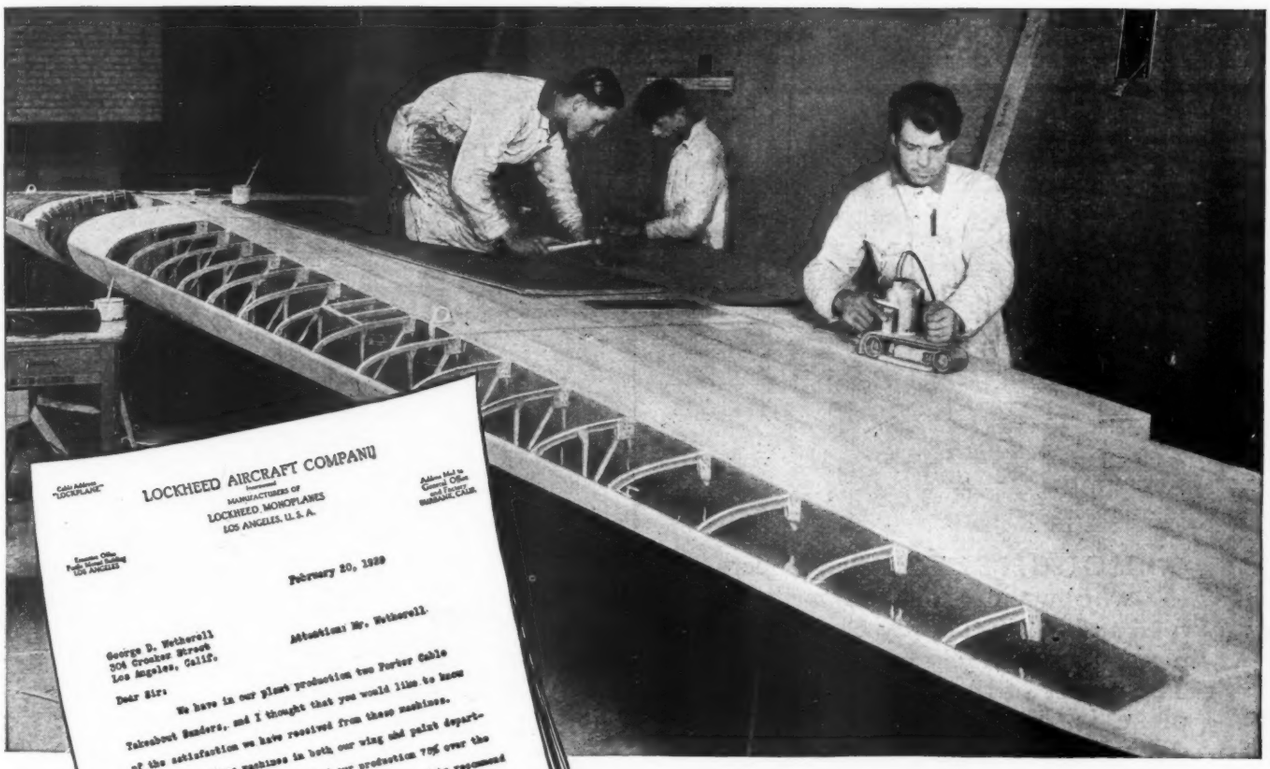

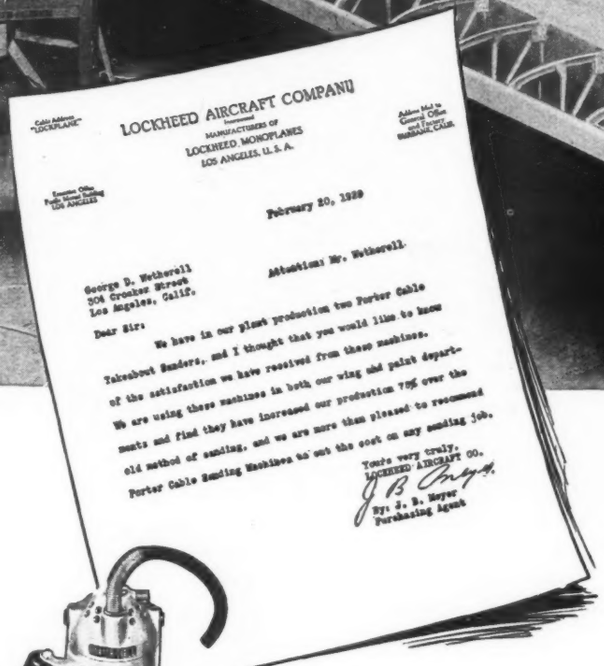
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Attention: Mr. Wetherell

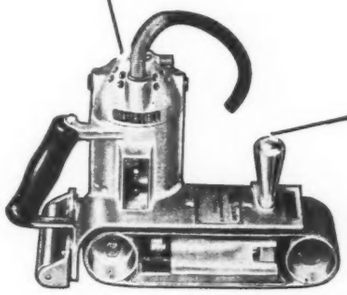
Dear Sir:

We have in our plant production two Porter Cable Takeabout Sanders, and I thought that you would like to know of the satisfaction we have received from these machines.

We are using these machines in both our wing and paint departments and find they have increased our production 75% over the old method of sanding, and we are more than pleased to recommend Porter Cable Sanding Machines to cut the cost on any sanding job.

Yours very truly,
LOCKHEED AIRCRAFT CO.

By: J. B. Hoyer
Purchasing Agent



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Speeds Lockheed Production

By eliminating tedious hand-sanding with the TAKE-ABOUT Sander

Lockheed stepped up their fuselage and wing finishing operations 75%! Again TAKE-ABOUT scores in another industry while still wrecking costs in the building, wood-working, metal and other fields where hand sanding, planing, and scraping were formerly required. Not only is it five to ten times faster, but the smooth, even belt action secures a rippleless surface of which Lockheed-Vega is conclusive proof.

Powered by a General Electric Universal motor and weighing only 14 lbs., it will surface almost any material within range of a light socket at a great saving to you. Also the SUPER TAKE-ABOUT, a heavy duty one H.P. model.

Ask for more information or a demonstration of how the TAKE-ABOUT will cut costs in your plant.

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Porter - Cable Belt Grinder Type B-3 gives fine straight grain finish on flat surfaces.

Porter - Cable Disc Sander and Grinder, Type D-2. For fast grinding on wood or metal.

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One taxiing plane + one wandering person = one Angel . .

THOUGHTLESS sightseers who wander out on a flying field and get in the way of a taxiing plane may suddenly become angels. The owner of the airport, or of the plane, is then likely to become the defendant in a damage suit.

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Representatives in other cities. Consult phone directory.

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Take pictures from the air with the new

FAIRCHILD AERIAL CAMERA

The new Fairchild F-4 "all-purpose" aerial camera accommodates roll film up to 75 feet in length.... enough for 110 exposures 7"x9⅛". Also standard 8"x10" cut film adapter.

EVERYWHERE today, photographs taken from the air are in demand. Real estate firms need maps of their land... city governments want towns mapped... papers and magazines need shots of news interest... advertisers ... public utilities ... all demand pictures from the air.

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This all-purpose Model F-4 was designed by the same men who built the cameras used by the U. S. Air Service ... the U. S. Navy ... the Royal Canadian Air Service ... Commander Byrd ... the Japanese Government ... and other foreign governments.

It is easy for you to get good pictures. This Model F-4 is fool-proof, simple and positive. This is why experts have selected the Fairchild Camera. The guesswork is out of it. There is no uncertainty.

Aerial photography is fascinating work, and offers another source of revenue for you. There is plenty of room in the field of aerial photography for those who enter it right now.

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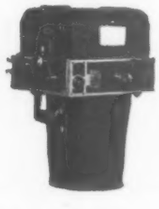
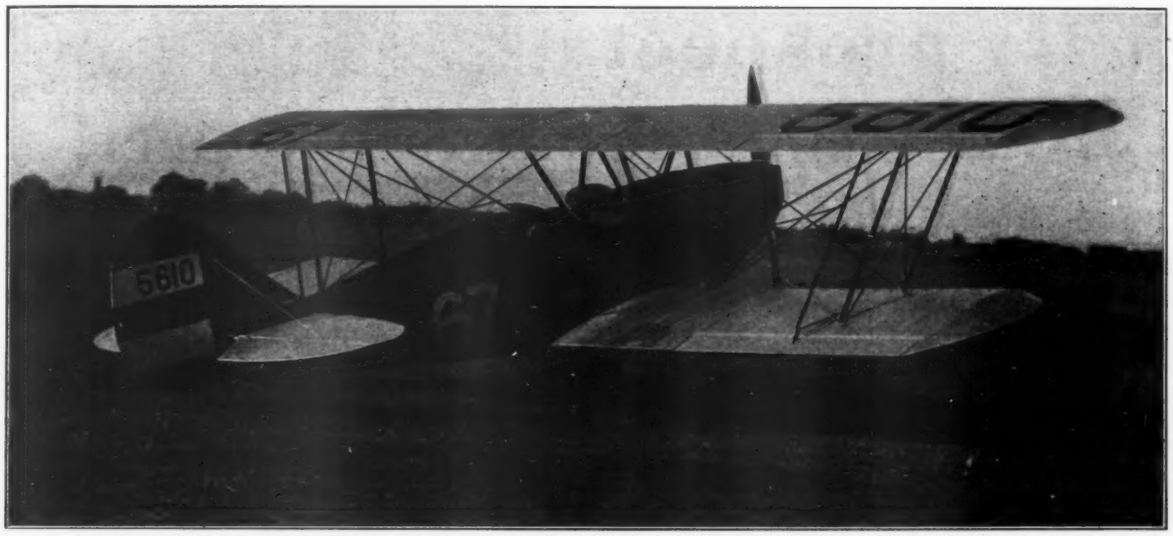


Either vertical or oblique pictures are easy with the manually operated F-4. Focusing mount... pictures 8 feet to infinity. Tessar F-4.5 lens. Focal length optional. Price with cut film adapter and vertical suspension mount, only $1,597



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The Pheasant design, with its combination wing sections, has proven itself to be the ideal for training, cross country flying or for the use of the private owner. Although possessing unmatched speed, it retains the quick take-off, ease of control, rapid climb and low landing speed, making flying in a Pheasant absolutely safe.

An illustrated folder on the construction and equipment of the Pheasant will be gladly sent anyone requesting it.

Price with OX5 Motor Installation, $2650.00.

Under a new sales policy recently inaugurated by the company, territory is now available to responsible dealers everywhere.

Write for complete information

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In addition to providing the high quality required, HASKELITE also produced a saving in costs for the Paramount Aircraft Corporation of Saginaw, Michigan. Writing about their four-place "Cabinaire" this company states:

"This plane was designed primarily as a strictly high class, medium sized, inclosed job. When the material specifications were made out for this plane, it naturally included the best products obtainable.

"The matter of our floor, dash, instrument panels, rib gussets, etc., was very easily and quickly decided by the use of HASKELITE, which incidentally has resulted in lowering of factory cost. We shall continue to use HASKELITE in Cabinaire."

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Every prospect
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The man who owns an American Eagle sales franchise never loses a customer through failure to supply the type of plane required. For the American Eagle line is a *complete* line, including all types now in demand, and varying in price from $1,895 to $18,895. There's a plane for every purse and purpose!

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Certain valuable territories are still being held open to dealers and distributors who can prove their qualifications. Write to us!

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Prominent German manufacturer of ALL-METAL AIRPLANES wishes to negotiate with American Airplane Manufacturing Company regarding license agreement. Representatives have just arrived here. If interested write

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Increased Enrollment Accrues to the School *with*

Maintenance and operating costs of the MONOPREP are but a fraction of the expense attached to the average training plane.

Often the same purchase money puts two MONOPREPS instead of a more expensive plane into service, which means two students in the air during the same hour. The side by side training permits instructor to cover each lesson thoroughly, *while the student is in the air.* This feature alone saves hours of time.

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Especially Designed for Economical Training

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Builders of the Monocoupe, Monocoach and Monoprep
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Note these Monoprep Features

Perfect vision in all directions—Oildraulic landing gear struts—Two Doors—Friese Type ailerons high lift wing—slow landing speed—Gas consumption 4 gals. per hour—five hours full.

Flyaway Price $2675

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High pressure lubrication of other than engine parts is becoming as common in aircraft as it is in automobiles. Airplanes are now being equipped with Alemite and Zerk fittings for the high pressure lubrication of landing gear, tail skids and control column assemblies.

The U. S. Electro Hy-Press Grease Gun has a decided advantage in speed, mobility and ease of operation. It is portable and fully self-contained, furnishing its own supply of compressed air for high pressure lubrication. One man can operate it, because a combination valve and switch on the grease hose gives instant control of grease and fast pumping.

The U. S. Greaser need never be idle around an airport. It is the fastest gun for chassis lubrication of automobiles and can be used to grease cars of airport executives and pilots while they are on flying duty.

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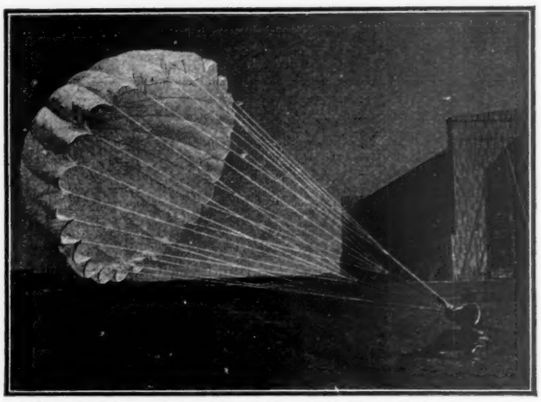

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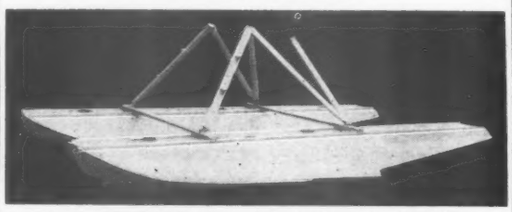

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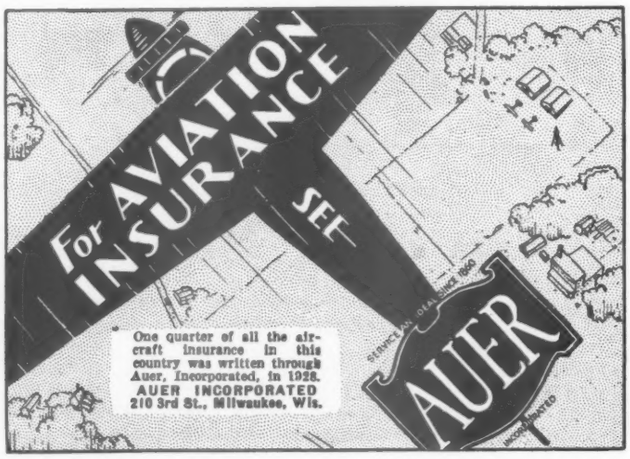
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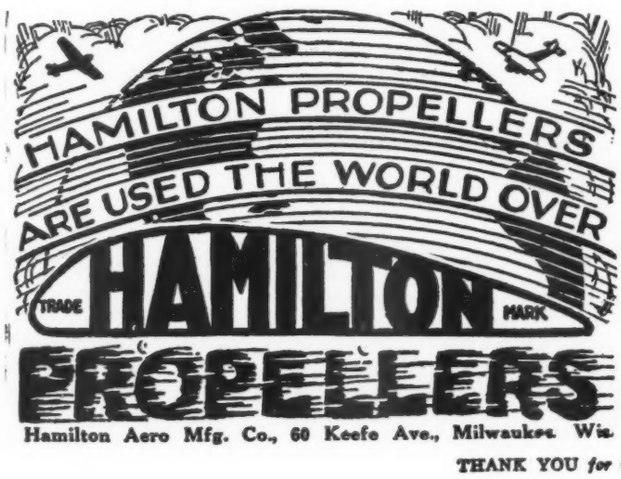

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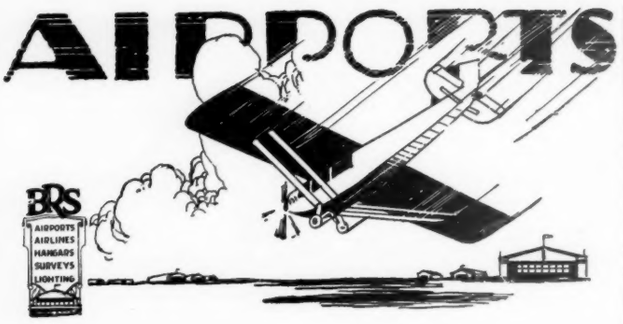

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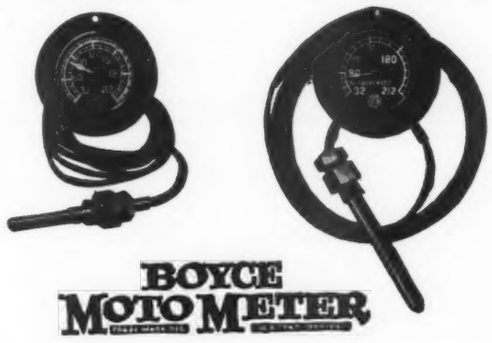

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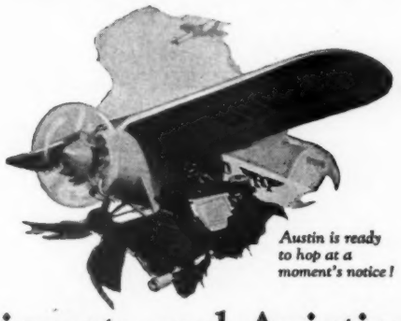

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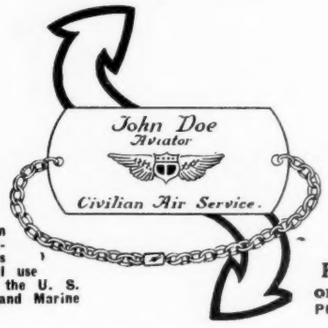

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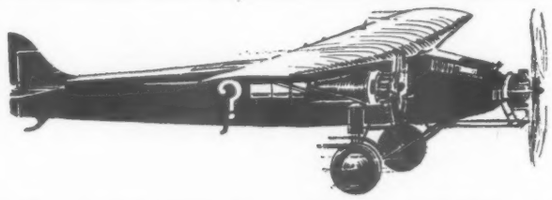

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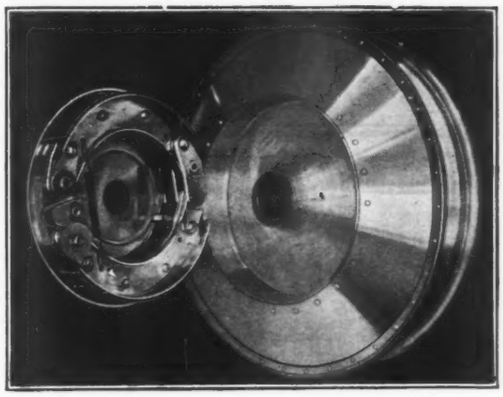

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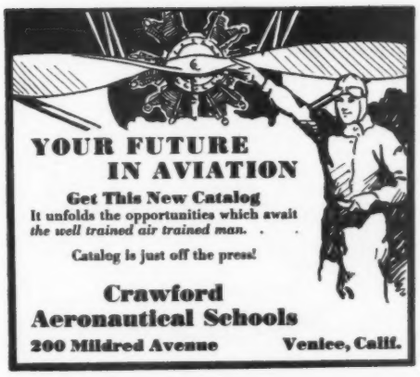

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TRANSPORT pilot, Kelly Field graduate 1919. Ten years experience commercial pilot, 2,500 hours flying. Best of references. Only most reliable connections considered. Available 15 days notice. PW-1235, AVIATION, 7 South Dearborn St., Chicago, Ill.

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PW-2 AVIATION, 7 South Dearborn St., Chicago, Ill.

YOUNG man, 9 years experience in national and savings banks, desires connection with Aircraft manufacturing or operating company. Age 27, married, references. PW-3, AVIATION, Tenth Ave., at 36th St., New York.

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Index to Advertisers

Addington Aircraft So. 992
Advance Aircraft Co. 944
Advance Aircraft Corp. 991
Aeromarine-Klemm Corp. 999
Air Associates, Inc. 992
Aircraft Service Director 992
Alexander Aircraft Co. 985
American Eagle Aircraft Corp. 982
Anchor Post Fence Co. 980
Auer, Inc. 986
Austin Co., The 989
Aviation Jewelry Co. 990
Aviation Protection, Inc. 986

Barber & Baldwin, Inc. 983
Bendix Brake Co. 991
Berliner-Joyce Aircraft Co., Inc. 939
Berry Bros. 988
Black & Bigelow, Inc. 992
Boston Auto Gage Co., The 992
Bourdon Aircraft Corp. 989
Box M-5 982
Box No. 1 987
Budd Wheel Co. 986
Burgess Battery Co. 989

Chicago International Aircraft Exhibit 992
Cleveland Pneumatic Tool Co. 945
Consolidated Aircraft Corp. 942
Consolidated Instrument Co. of America, Inc. 988
Coward-McCann, Inc. 988

Davis Aircraft Corp. 940-941
Davis Adv. Ag., The Winfield D. 988
Dobler, Paul 992

Eagle Ottawa Leather Co. 987
Edo Aircraft Corp. 986

Fairchild Aerial Camera Corp. 980
Fairchild Aviation Corp. & Subsidiaries 987
Flottorp Propeller Co. 992
Flyers, Inc. 992
Frank K. G. (Siemens & Halske) 987

Gardner Propeller Works 992

Hamilton Aero Mfg. Co. 987
Haskelite Mfg. Co. 981
Heald Machine Co. 938

International Nickle Co. 998
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Miller, P. Wendell & Associates 989
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Moto Meter Co., The 989

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Pitcairn Aviation, Inc. 991
Plycor Co., The 992
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Skinner & Cook 992
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Star Aircraft Co. 985
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Head and Shoulders Above!

●

A MANUFACTURER of tools suitable for aircraft manufacture and repair was so impressed with the circulation figures of a monthly aircraft publication that it was decided to use that publication exclusively for the manufacturer's first advertising campaign to the aircraft industry.

It was suggested to this manufacturer that he make a survey among the aircraft manufacturers and obtain their opinions of the leading aircraft magazines. This was done.

The result: An exclusive contract for pages was placed with AVIATION with the statement that

"The survey showed AVIATION *head and shoulders above any other aircraft publication and that* AVIATION *would be the only medium used during the next year."*

An analysis of AVIATION's *Quality* circulation and a survey of reader preference among aircraft, aircraft engine, accessory and equipment manufacturers, and among airplane operators and pilots, airport committees and managers will confirm the fact that AVIATION is the leading American aircraft publication and the most productive aeronautical sales medium.

Applicant for Audit Bureau of Circulations membership.

Send for geographical distribution and occupational classification of circulation.

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

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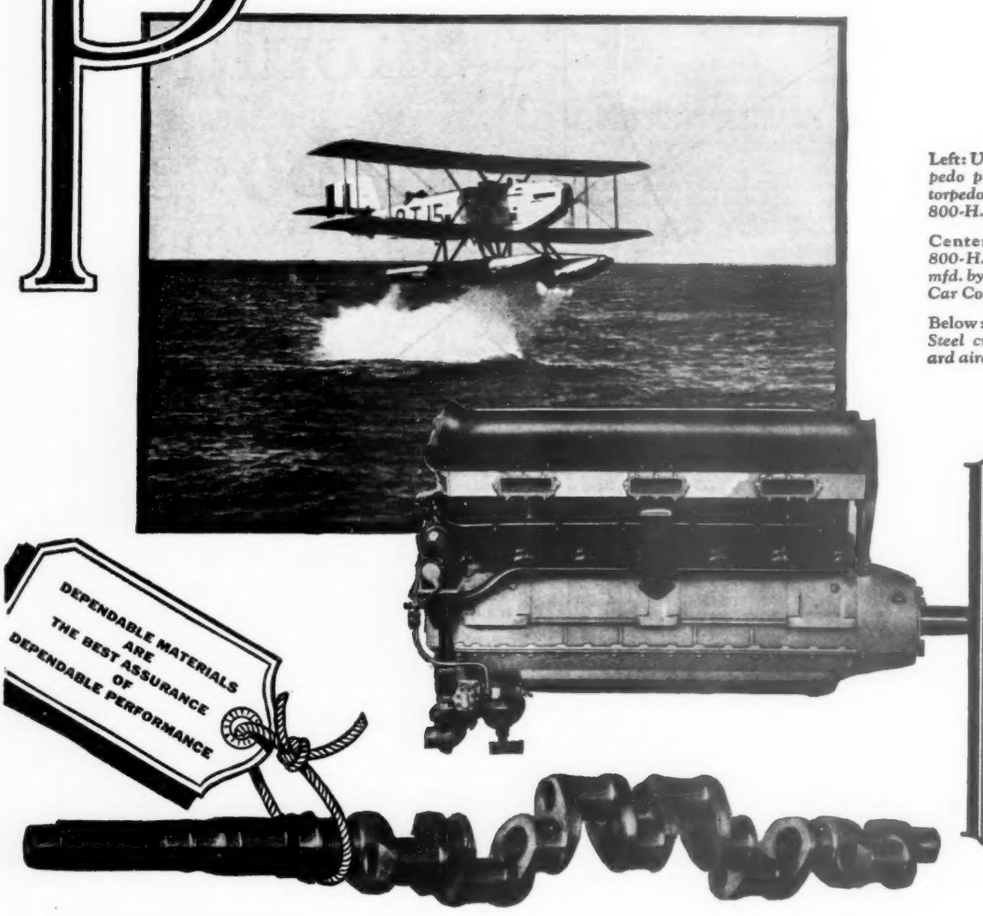
PACKARD



Left: U. S. Navy Martin torpedo plane firing 1700-lb. torpedo. Plane equipped with 800-H. P. Packard engine.

Center: Model A 2500, 800-H. P. aircraft engine mfd. by The Packard Motor Car Co., Detroit, Mich.

Below: Nickel Chromium Steel crankshaft for Packard aircraft engine.

NICKEL ALLOY STEEL PARTS IN PACKARD AIRCRAFT ENGINE

Crankshaft
Gears
Connecting rods
Piston pins
All studs and bolts

Another famous aircraft engine manufacturer assures dependability by using Nickel Alloy Steel parts

IN United States Navy maneuvers in Southern waters last winter, nineteen Martin torpedo planes, equipped with 800-H.P. Packard Model A, direct drive engines, flew from Hampton Roads, Va. to Guantanamo, Cuba and back without a single major replacement or breakdown in any engine. The Martin plane, powered by a single Packard engine, carries a 1700-pound torpedo and a crew of three men.

The remarkable performance of these famous aircraft engines can be attributed to excellent design and to the dependability of Nickel Alloy Steel parts. Nickel Alloy Steel is used for crankshafts, gears, connecting rods, studs, bolts and piston pins.

The outstanding performance records of Nickel Alloy Steel parts employed by all leading manufacturers of aircraft engines afford conclusive proof of the dependability of these steels. The experience of typical users has contributed to an extensive fund of valuable technical data. You are invited to consult our engineers and draw upon this information at any time.

Nickel
FOR ALLOY STEEL

SEND FOR "BUYERS' GUIDE TO NICKEL ALLOY STEEL PRODUCTS".

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

The AVIATION MARKET

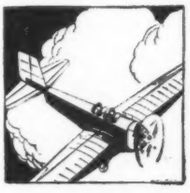
Where it is, what it is, and WHY . . . .

Predictions indicate that there will be more airplanes produced in this country during 1929 than there will be pilots—people qualified to fly them. Thus, aviation presents a marketing problem, the solution of which is quite obviously . . . *the training of more pilots.*

★ ★ ★

To train pilots, however, there must be more and better flying schools, conveniently located in the areas that have the greatest number of prospects. And, there must be a type of training plane, which, by design, construction and proven performance, will stand the gaff of flying instruction . . . *safely and economically.*

★ ★ ★



As a solution to this problem, we offer to commercial aviation a training plane of proven merit . . . the Aeromarine Klemm, *AKL25,* known throughout Europe as the Klemm monoplane. In Germany, Switzerland, Norway, Sweden, Denmark, Russia, Spain, Italy, South America and South Africa, it is used extensively for training purposes.

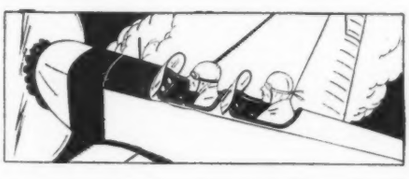
★ ★ ★

The engineering principles embodied in the *AKL25* enable it to take off and to land in the smallest and roughest of fields. Due to its

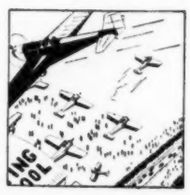
superior gliding qualties and its inherent stability, it will glide farther and with a greater degree of controllability at lower speeds than any other type of plane in existence today. Equipped with a forty horse-power Salmson engine, an *AKL25* will carry two people one hundred miles on less than four gallons of fuel. Compare this economy of operation with that of planes now used for flying instruction.

★ ★ ★

If no other qualification were considered in the selection of an airplane for training purposes, the simplicity of the construction in the *AKL25* would win your approval. For, there are no wires to slack, and, all parts are interchangeable. The entire plane can be dismantled and assembled by two men in a few minutes. Skilled attention is unnecessary, and maintenance is consequently at its minimum. With the wings spread ready for flight or detached for storage, the weight of an *AKL25* is so distributed that one person can tow it with ease. As for performance, one demonstration will convince you beyond any possible doubt.



Distributors and dealers who Understand . . .



For the distributor and the dealer who understand the aviation market situation, there is an opportunity to make 1929 a most lucrative year. Because, the major market of aviation is unquestionably flying instruction . . . flying schools . . . and, the right plane for that particular purpose.

★ ★ ★

The distribution of the Aeromarine Klemm *AKL25* is national in scope, and, there are still available some very desirable territories. We are interested in opening negotiations with highly responsible individuals and corporations—men who know aviation and have sufficient subscribed capital to render a genuine service.

★ ★ ★

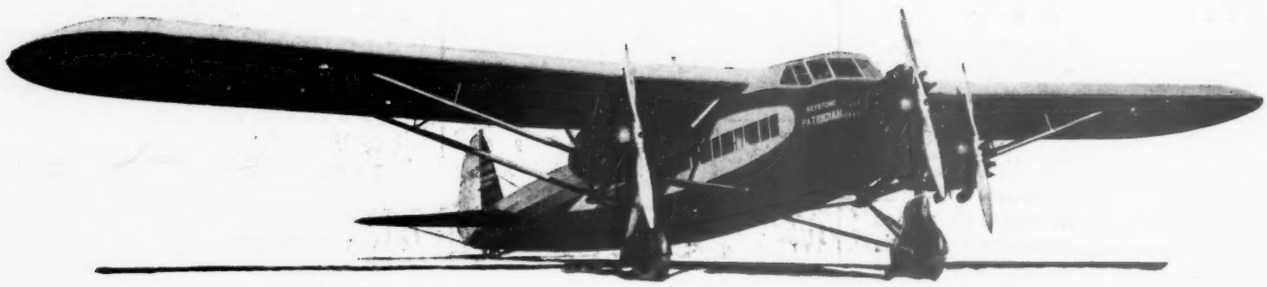
The progress of aviation depends fundamentally, we believe, on the well-known four factors—*men, money, methods, and markets.* That is why we want *men* . . . distributors and dealers . . . who have sufficient *money* with which to work, who have an appreciation of modern merchandising *methods,* and, who know the *aviation market.*

★ ★ ★

If you can fulfil these qualifications, write us for details. Our franchise is liberal . . . our product is profitable . . . and, we are prepared to make immediate deliveries.

AEROMARINE KLEMM CORPORATION

Paramount Building · 44th Street *and* Broadway · New York City



PIONEER INSTRUMENTS

on the

Keystone Patrician

The Keystone Patrician is equipped with these Pioneer Instruments and Equipment

ON THE PILOT'S PANEL

Air Speed Indicator
Altimeter
Climb Indicator
Fuel Level Gauges
Landing Lights & Switches
Magnetic Compass
Magneto Switch
Navigation Lights & Switch
Oil Pressure Gauge
Turn and Bank Indicator
Thermometer
Watch

ON THE CABIN PANEL

Altimeter
Air Speed Indicator
Clock

Monster passenger planes are developing a new era in aviation.

We congratulate the Keystone Aircraft Corporation, makers of the Patrician, on their entry into this field.

And we appreciate the confidence that has been placed in Pioneer Instruments. A cargo of twenty passengers entails a responsibility that requires more than ordinary accuracy and dependability.

PIONEER INSTRUMENT COMPANY
754 LEXINGTON AVE. BROOKLYN NEW YORK

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